ENGLISH MANUAL

THE MANUAL

VIRGIN INTERACTIVE ENTERTAINMENT (EUROPE) LTD.
338a LADBROKE GROVE
LONDON W10 5AH
081 960 2255 voice
081 964 4033 BBS
081 964 8242 helpline

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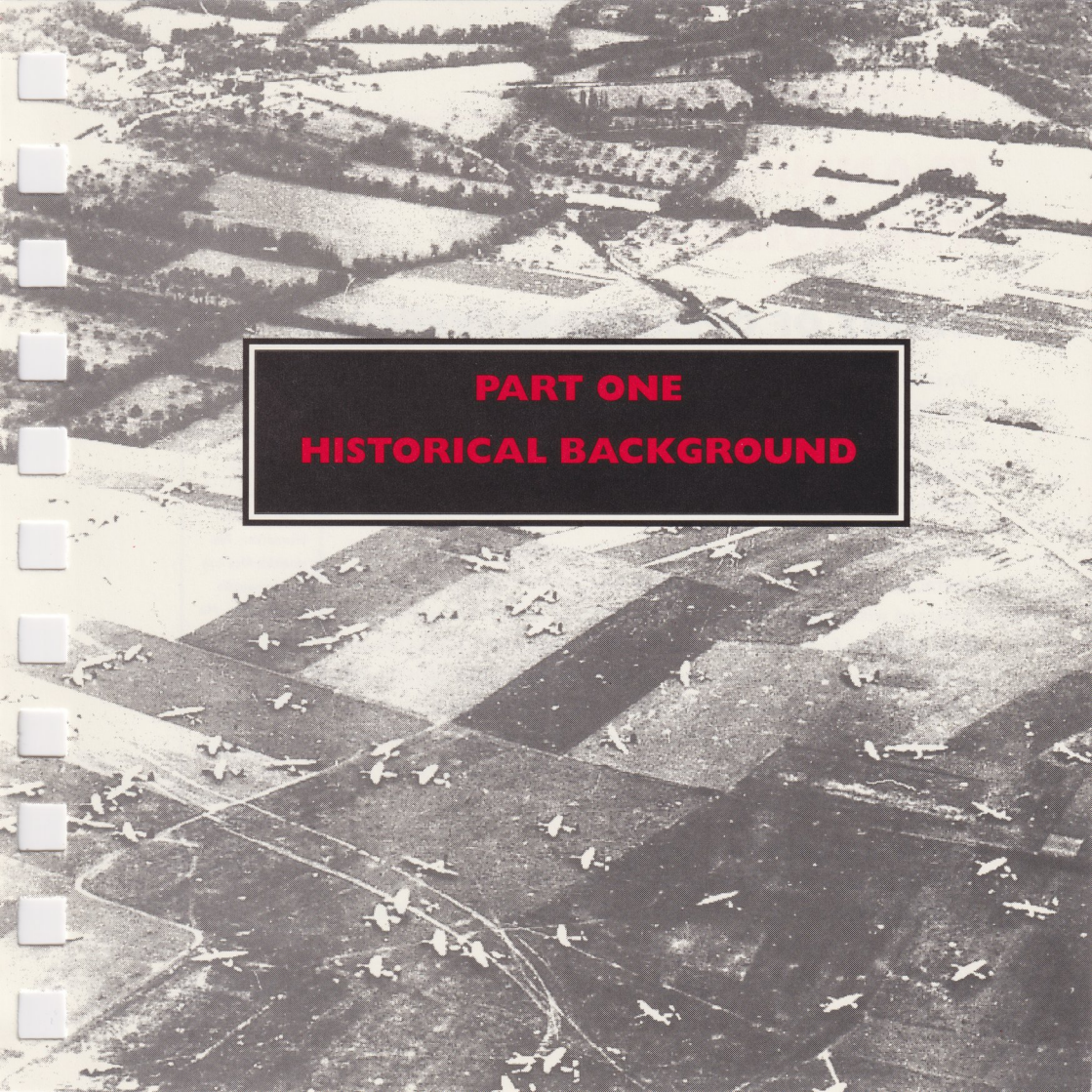
LCG's and LCF's prepare for D-Day



PART ONE
HISTORICAL BACKGROUND

PLANNING FOR COMBAT: THE BUILD-UP

DIGEST OF OPERATION OVERLORD

What follows is a unique document taken from the Offices of the War Cabinet, S.W. 1, 30th July, 1943. It postulates what form an invasion plan could or should take and provides a valuable study for what was formally suggested and what actually happened one year later (see the actual historical account elsewhere for comparison).

The fighter pilot is an independent character. He doesn't like too many people around him. He is an individualist.

Colonel Erich "Bubi" Hartmann, GAF, World's Leading Ace, Luftwaffe, WWII, 352 Victories

1. The object of Operation "Overlord" is to mount and carry out an operation, with forces and equipment established in the United Kingdom, and with target date the 1st May, 1944, to secure a lodgement on the Continent from which further offensive operations can be developed. The lodgement area must contain sufficient port facilities to maintain a force of some 26 to 30 divisions and enable that force to be augmented by follow-up shipments from the United States or elsewhere of additional divisions and supporting units at the rate of three to five divisions per month.

Selection of a Lodgement Area.

2. In order to provide sufficient port facilities to maintain these large forces, it will be necessary to select a lodgement area which includes a

Any soldier knows that during a war it is not always the ponderables that count, but that a great deal depends on luck.

Lt. General Adolph Galland, Luftwaffe

group of major ports. We must plan on the assumption that ports, on capture, will be seriously damaged and probably blocked. It will take some time to restore normal facilities. We shall thus be forced to rely on maintenance over beaches for an extended period.

3. A study of the beaches on the Belgian and Channel coasts shows that the beaches with the highest capacity for passing vehicles and stores inland are those in the Pas de Calais and the Caen-Cotentin area. Of these, the Caen beaches are the most favourable as they are, unlike the others, sheltered from the prevailing winds. Naval and air considerations point to the area between the Pas de Calais and the Cotentin as the most suitable for the initial landing, air factors of optimum air support and rapid provision of airfields indicating the Pas de Calais as the best choice, with Caen as an acceptable alternative.

4. Thus, taking beach capacity and air and naval considerations together, it appears that either the Pas de Calais area or the Caen-Cotentin area is the most suitable for the initial main landing.

5. As the area for the initial landing, the Pas de Calais has many obvious advantages such that good air support and quick turn around for our shipping can be achieved. On the other hand, it is a focal point of the enemy fighters disposed for defence, maximum enemy air activity can be brought to bear over this area with the minimum movement of his air forces. Moreover, the Pas de Calais is the most strongly defended area on the whole French coast. The defences would require very heavy and

sustained bombardment from sea and air: penetration would be slow and the result of the bombardment of beach exits would severely limit the rate of build-up. Further, this area does not offer good opportunities for expansion. It would be necessary to develop the bridgehead to include either the Belgian ports as far as Antwerp or the Channel ports Westwards to include Havre and Rouen. However both an advance to Antwerp across the numerous water obstacles and a long flank march of some 120 miles to the Seine ports must be considered unsound operations of war unless the German forces are in a state not far short of final collapse.

6. In the Caen-Cotentin area it would be possible to make our initial landing either partly on the Cotentin Peninsula and partly on the Caen beaches, wholly in the Cotentin or wholly on the Caen beaches. An attack with part of our forces in the Cotentin and part on the Caen beaches is, however, considered to be unsound. It would entail dividing our limited forces by the low-lying marshy ground and intricate river system at the neck of the Cotentin Peninsula, thus exposing them to defeat in detail.

7. An attack against the Cotentin Peninsula, on the other hand, has a reasonable chance of success and would ensure the early capture of the port of Cherbourg. Unfortunately, very few airfields exist in the Cotentin, that area is not suitable for rapid airfield development. Furthermore, the narrow neck of the Peninsula would give the Germans an easy task in preventing us from breaking out and expanding our initial bridge head.

I attempt to attack out of the sun. If the enemy aircraft is surprised, he's duck soup, but time is an important factor and it should not be wasted in securing position.

Lt. Colonel John C. Meyer, USAAF

The logic of the theory of probabilities showed us incontestably that one's number was up after a certain amount of sorties. For some it was sooner, for some later.

Lt. General Adolph Galland, Luftwaffe

Moreover, during the period of our consolidation in the Cotentin the Germans would have time to reinforce their coastal troops in the Caen area, rendering a subsequent amphibious assault in that area much more difficult.

8. There remains the attack on the Caen beaches. The Caen sector is weakly held, the defences are relatively light and the beaches are of high capacity and sheltered from the prevailing winds. Inland, the terrain is suitable for airfield development and for the consolidation of the initial bridgehead and much of it is unfavourable for counter-attacks by panzer divisions. Maximum enemy air opposition can only be brought to bear at the expense of the enemy air defence screen covering the approaches to Germany and the limited number of enemy airfields within range of the Caen area facilitates local neutralisation of the German fighter force. The sector suffers from the disadvantage that considerable effort will be required to provide adequate air support to our assault forces and some time must elapse before the capture of a major port.

After a landing in the Caen sector it would be necessary to seize either the Seine group of ports or the Brittany group of ports. To seize the Seine ports would entail forcing a crossing of the Seine, which is likely to require greater forces than we can build up through the Caen beaches and the port of Cherbourg. It should, however, be possible to seize the Brittany ports between Cherbourg and Nantes and on them build up sufficient forces for our final advance Eastwards.

Provided that the necessary air situation can first be achieved, the chances of a successful attack and of rapid subsequent development are so much greater in this sector than in any other that it is considered that the advantages far outweigh the disadvantages.

The Lodgement Area Selected.

9. In the light of these factors, it is considered that our initial landing on the Continent should be effected in the Caen area, with a view to the eventual seizure of a lodgement area comprising the Cherbourg-Brittany group of ports (from Cherbourg to Nantes).

Opening Phase up to the Capture of Cherbourg.

10. The opening phase in the seizing of this lodgement area would be the effecting of a landing in the Caen sector with a view to the early capture and development of airfield sites in the Caen area and of the port of Cherbourg.

11. The main limiting factors affecting such an operation are the possibility of attaining the necessary air situation, the number of offensive divisions which the enemy can make available for counter attack in the Caen area, the availability of landing ships and craft and of transport aircraft and the capacity of the beaches and ports in the sector.

12. Although the strength of the G.A.F. available in 1944 on the Western front cannot be forecast at this stage, we can confidently expect that we shall have a vast numerical superiority in bomber forces. The first-line strength of the German fighter force is, however, showing

Today it is even more important to dominate the...highly sophisticated weapon systems, perhaps even more important than being a good pilot; to make the best use of this system.

Lt. General Adolph Galland, Luftwaffe

What does not destroy me makes me stronger.

Prussian Military Axiom

a steady increase and although it is unlikely to equal the size of the force at our disposal, there is no doubt that our fighters will have a very large commitment entailing dispersal and operations at maximum intensity. Our fighters will also be operating under serious tactical disadvantages in the early stages, which will largely offset their numerical superiority. Before the assault takes place, therefore, it will be necessary to reduce the effectiveness of the G.A.F., particularly that part which can be brought to bear against the Caen area.

Rommel inspects coastal defences.

13. The necessary air situation to ensure a reasonable chance of success will therefore require that the maximum number of German fighter forces are contained in the Low Countries and north-west Germany, that the effectiveness of the fighter defence in the Caen area is reduced and that air reinforcements are prevented from arriving in the early stages from the Mediterranean. Above all, it will be necessary to reduce the overall strength of the German fighter force between now and the date of the operation by destruction of the sources of supply, by the infliction of casualties by bringing on air battles, and, immediately prior to the assault, by the disorganisation of G.A.F. installations and control system in the Caen area.

14. As it is impossible to forecast with any accuracy the number and location of German formations in reserve in 1944, while, on the other hand, the forces available to us have been laid down, an attempt has been made in this paper to determine the wisest employment of our own forces and then to determine the maximum number of German formations which they can reasonably overcome. Apart from the air situation, which is an over-riding factor, the practicability of this plan will depend principally on the number, effectiveness and availability of German divisions present in France and the Low Countries in relation

If you see enemy aircraft, it is not necessary for you to go straight to them and attack. Wait and look and use your reason. See what kind of formation and tactics they are using. See if there is a straggler or an uncertain pilot among the enemy. Such a pilot will always stand out. Shoot him down. It is more important to send one down in flames—so that all the enemy pilots can see the loss and experience its psychological effect—than to wade into a 20-minute dogfight in which nothing happens.

Colonel Erich "Bubi" Hartmann, GAF, World's Leading Ace, Luftwaffe, WWII, 352 Victories

> *At the start, the American escort also made tactical mistakes. Instead of operating offensively against our fighter units, they limited themselves to a close direct escort. They tried to repulse our attacks in the close vicinity of the bombers. In doing this they went through the same negative experiences as we had done over England and Malta: the fighter pilot who is not at all times and at any place offensive loses the initiative of action. The American fighters learned and readjusted themselves. After January 1944, they went over to aggressive free-for-all fights in the approach sector.*
>
> *Lt. General Adolph Galland, Luftwaffe*

to our own capabilities. This consideration is discussed below (paragraph 35).

15. A maximum of 30 and a minimum of 26 equivalent divisions are likely to be available in the United Kingdom for cross-Channel operations on the 1st May 1944. Further build-up can be at the rate of three to five divisions per month.

16. Landing ships and craft have been provided to lift the equivalent of three assault divisions and two follow-up divisions, without 'overheads,' and it has been assumed that the equivalent of an additional two divisions can be afloat in ships.

17. Airborne forces amounting to two airborne divisions and some five or six parachute regiments will be available but, largely owing to shortage of transport aircraft, it is only possible to lift the equivalent of two-thirds of one airborne division simultaneously, on the basis of present forecasts.

18. Even if additional landing ships and craft could be made available, the beaches in the Caen area would preclude the landing of forces greater than the equivalent of the three assault and two follow-up divisions, for which craft have already been provided. Nevertheless, an all-round increase of at least 10 per cent. in landing ships and craft is highly

desirable in order to provide a greater margin for contingencies within the framework of the existing plan. Furthermore, sufficient lift for a further assault division could most usefully be employed in an additional landing on other beaches.

19. There is no port of any capacity within the sector although there are a number of small ports of limited value. Maintenance will, therefore, of necessity be largely over the beaches until it is possible to capture and open up the port of Cherbourg. In view of the possibilities of interruption by bad weather it will be essential to provide early some form of improvised sheltered waters.

20. Assuming optimum weather conditions, it should be possible to build up the force over the beaches to a total by D plus 6 of the equivalent of some 11 divisions and five tank brigades and thereafter to land one division a day until about D plus 24.

One of the secrets of air fighting was to see the other man first. Seeing airplanes from great distances was a question of experience and training, of knowing where to look and what to look for. Experienced pilots always saw more than the newcomers, because the latter were more concerned with flying than fighting....The novice had little idea of the situation, because his brain was bewildered by the shock and ferocity of the fight.

Air Vice-Marshal
J.E. "Johnnie" Johnson, RAF

MURPHY'S LAWS OF COMBAT - 25.
Things that must be together to work usually can't be shipped together.

Throughout the story of air fighting runs the quest for height, for the fighter on top had control of the air battle.

Air Vice-Marshal J.E. "Johnnie" Johnson, RAF

Proposed Plan.

Preliminary Phase.

21. During the preliminary phase, which must start forthwith, all possible means including air and sea action, propaganda, political and economic pressure and sabotage, must be integrated into a combined offensive aimed at softening the German resistance. In particular, air action should be directed towards the reduction of the German air forces on the Western front, the progressive destruction of the German economic system and the undermining of German morale.

"Omaha" beach - 21 June 1944

22. In order to contain the maximum German forces away from the Caen area diversionary operations should be staged against other areas such as the Pas de Calais and the Mediterranean Coast of France.

Preparatory Phase.

23. During this phase air action will be intensified against the G.A.F., particularly in north-west France, with a view to reducing the effectiveness of the G.A.F. in that area and will be extended to include attacks against communications more directly associated with movement of German reserves which might affect the Caen area. Three naval assault forces will be assembled with the naval escorts and loaded at ports along the South Coast of England. Two naval assault forces carrying the follow-up forces will also be assembled and loaded, one in the Thames Estuary and one on the West Coast.

The Assault.

24. After a very short air bombardment of the beach defences three assault divisions will be landed simultaneously on the Caen beaches, followed up on D-Day by the equivalent of two tank brigades (United States regiments) and a brigade group (United States regimental combat team). At the same time, airborne forces will be used to seize the town of Caen; and subsidiary operations by commandos and, possibly, by airborne forces will be undertaken to neutralise certain coast defences and seize certain important river crossings. The object of the assault forces will be to seize the general line Grandcamp-Bayeux-Caen.

Encourage and listen well to the words of your subordinates. It is well known that gold lies hidden underground.

Nabeshima Naoshige, 1618

MURPHY'S LAWS OF COMBAT - 26.
Radios will fail as soon as you need fire support desperately.

I fly close to my man, aim well and of course then he falls down.

Captain Oswald Boelcke, Probably the World's First Ace, GAS, WWI

Follow-up and Build-up Phase.

25. Subsequent action will take the form of a strong thrust Southwards and south-westwards with a view to destroying enemy forces, acquiring sites for airfields and gaining depth for a turning movement into the Cotentin Peninsula directed on Cherbourg. When sufficient depth has been gained a force will advance into the Cotentin and seize Cherbourg. At the same time a thrust will be made to deepen the bridgehead south-eastwards in order to cover the construction and operation of additional airfields in the area south-east of Caen.

Various types of landing craft prepararing for Normandy

26. It is considered that, within 14 days of the initial assault, Cherbourg should be captured and the bridgehead extended to include the general line Trouville-Alencon-Mont St. Michel. By this date, moreover, it should have been possible to land some 18 divisions and to have in operation about 14 airfields from which 28 to 33 fighter-type squadrons should be operating.

Further Developments after Capture of Cherbourg.

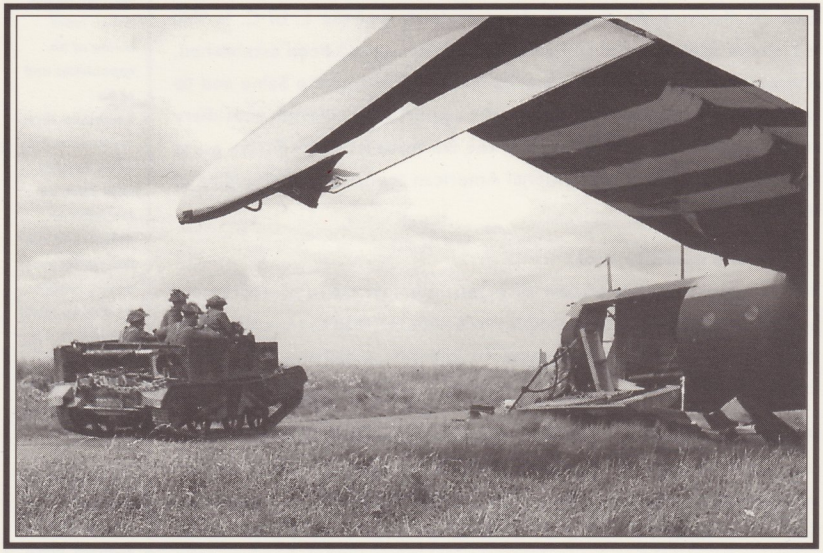
27. After the capture of Cherbourg the Supreme Allied Commander will have to decide whether to initiate operations to seize the Seine ports or whether he must content himself with first occupying the Brittany ports. In this decision he will have to be guided largely by the situation of the enemy forces. If the German resistance is sufficiently weak, an immediate advance could be made to seize Havre and Rouen. On the other hand, the more probable situation is that the Germans will have retired with the bulk of their forces to hold Paris and the line of the Seine, where they can best be covered by their air forces from north-east France and where they may possibly be reinforced by formations from Russia. Elsewhere they may move a few divisions from Southern France to hold the crossings of the Loire and will leave the existing defensive divisions in Brittany.

It will therefore most probably be necessary for us to seize the Brittany ports first, in order to build up sufficient forces with which we can eventually force the passage of the Seine.

As to gunnery passes, the best was when you dived with speed, made one pass, shot an opponent down quickly, and pulled back up....The secret was to do the job in one pass; it could be from the side or from behind and I usually tried to open fire at about 150 feet.

Major Erich Rudorffer, Luftwaffe, Seventh Leading Ace, WWII, 222 Victories (13 on One Mission)

28. Under these circumstances, the most suitable plan would appear to be to secure, first, the left flank and to gain sufficient airfields for subsequent operations. This would be done by extending the bridgehead to the line of the River Eure from Dreux to Rouen and thence along the line of the Seine to the sea, seizing at the same time Chartres, Orleans and Tours.



A Bren Carrier passing a crash-landed glider.

29. Under cover of these operations a force would be employed in capturing the Brittany ports; the first step being a thrust Southwards to seize Nantes and St. Nazaire, followed by subsidiary operations to capture Brest and the various small ports of the Brittany Peninsula.

30. This action would complete the occupation of our initial lodgement area and would secure sufficient major ports for the maintenance of at least 30 divisions. As soon as the organisation of the L. of C. in this lodgement area allowed and sufficient air forces had been established, operations would then be begun to force the line of the Seine and to capture Paris and the Seine ports. As opportunity offered, subsidiary action would also be taken to clear the Germans from the Biscay ports to facilitate the entry of additional American troops and the feeding of the French population.

Nothing makes a man more aware of his capabilities and of his limitations than those moments when he must push aside all the familiar defences of ego and vanity, and accept reality by staring, with the fear that is normal to a man in combat, into the face of Death.

Major Robert S. Johnson, USAAF, 27 Victories, WWII

Command and Control.

31. In carrying out Operation 'Overlord' administrative control would be greatly simplified if the principle were adopted that the United States forces were normally on the right of the line and the British and Canadian forces on the left.

Major Conditions Affecting Success of the Operation.

32. It will be seen that the plan for the initial landing is based on two main principles-concentration of force and tactical surprise. Concentration of the assault forces is considered essential if we are to ensure adequate air support and if our limited assault forces are to avoid defeat

MURPHY'S LAWS OF COMBAT - 27.
Anything you do can get you shot—including doing nothing.

Aerial gunnery is 90 percent instinct and 10 percent aim.

Captain Frederick C. Libby, RFC, First American to Shoot Down 5 Enemy Aircraft, WWI, 24 Victories, (10 as Observer, 14 as Pilot)

in detail. An attempt has been made to obtain tactical surprise by landing in a lightly defended area, presumably lightly defended as, due to its distance from a major port, the Germans consider a landing there unlikely to be successful. This action, of course, presupposes that we can offset the absence of a port in the initial stages by the provision of improvised sheltered waters. It is believed that this can be accomplished.

33. The operation calls for a much higher standard of performance on the part of the naval assault forces than any previous operation. This will depend upon their being formed in sufficient time to permit of adequate training.

Royal Marine Commando Troops.

34. Above all, it is essential that there should be an over-all reduction in the German fighter force between now and the time of the surface assault. From now onwards every practical method of achieving this end must be employed. This condition, above all others, will dictate the date by which the amphibious assault can be launched.

35. The next condition is that the number of German offensive divisions in reserve must not exceed a certain figure on the target date if the operation is to have a reasonable chance of success. The German reserves in France and the Low Countries as a whole, excluding divisions holding the coast, G.A.F. divisions and training divisions, should not exceed on the day of the assault 12 full-strength first-quality divisions. In addition, the Germans should not be able to transfer more than 15 first-quality divisions from Russia during the first two months. Moreover, on the target date the divisions in reserve should be so located that the number of first-quality divisions which the Germans could deploy in the Caen area to support the divisions holding the coast should not exceed three divisions on D-Day, five divisions on D plus 2, or nine divisions by D plus 8.

During the preliminary period, therefore, every effort must be made to dissipate and divert German formations, lower their fighting efficiency and disrupt communications.

36. Finally, there is the question of maintenance. Maintenance will have to be carried out over beaches

I gained in experience with every plane shot down, and now was able to fire in a calm, deliberate manner. Each attack was made in a precise manner. Distance and deflection were carefully judged before firing. This is not something that comes by accident; only by experience can a pilot overcome feelings of panic. A thousand missions could be flown and be of no use if the pilot had not exchanged fire with the enemy.

Major John T. Godfrey, USAAF, 16.33 Victories, WWII

for a period of some three months for a number of formations, varying from a maximum of 18 divisions in the first month to twelve divisions in the second month, rapidly diminishing to nil in the third month. Unless adequate measures are taken to provide sheltered waters by artificial means, the operation will be at the mercy of the weather. Moreover, special facilities and equipment will be required to prevent undue damage to craft during this extended period. Immediate action for the provision of the necessary requirements is essential.

37. Given these conditions-a reduced G.A.F., a limitation in the number or effectiveness of German offensive formations in France, and adequate arrangements to provide improvised sheltered waters-it is considered

The guy who wins is the guy who makes the fewer gross mistakes.

Lieutenant Jim "Huck" Harris, USN, US Navy Fighter Weapons School Instructor

U.S. Army troops land in Normandy

that Operation 'Overlord' has a reasonable prospect of success. To ensure these conditions being attained by the 1st May, 1944, action must start now and every possible effort made by all means in our power to soften German resistance and to speed up our own preparations.

PRETTY IN PINK

One of the most unusual sights over the D-Day skies were the pale pink Spitfire FRIXs, fighter-reconnaissance aircraft carrying guns and a camera. These aircraft, of No.16 Squadron, carried invasion stripes under the rear fuselage only.

General Eishenhower in Normandy, June 1944.

Observation Corps.

GOGGLE EYED

About halfway back across the Channel I suddenly found there were six 109s behind me. I'd been flying with the cockpit canopy slid back and my goggles on my forehead for better visibility. Immediately, I half rolled and tried to close the canopy. This would come only halfway where it jammed before jettisoning itself entirely. Before I could get my goggles down a cloud of dust and grit came up from the cockpit and hit me in the face and eyes.

Then my goggles were caught in the slipstream and snatched off. During this period I was attempting to outmanoeuvre the 109s. At around 5000ft one of the 109s went past me in an inverted dive. Later, when on the ground at Hawkinge, the Navy confirmed seeing this crash into the sea. Also, the 'Y' section reported hearing German pilots calling one of their comrades without getting a reply. So I was credited with scoring a 109 - without even firing at it!

Jackie Mann DFM, CBE [Member of the famous Guinea Pig Club after suffering burns due to being shot down by a Me109, Jackie Mann was one of the Beirut hostages released in a blaze of world publicity in 1991, he was made a CBE in December of that year.]

THE FUEHRER'S DIRECTIVE ON DEFENCE OF WESTERN EUROPE

Dated as 3 November 1943, just a few months until the launch of Overlord, the following fascinating document shows how aware Hitler was of an attack and what measures he was taking to prevent it.

Fuehrer Headquarters - 3 November 1943
Top Secret
The Fuehrer
OKW/WFSt/Op.No. 662656/43 g.K. Chefs - 27 Copies
Directive No. 51

For the last two and one-half years the bitter and costly struggle against Bolshevism has made the utmost demands upon the bulk of our military resources and energies. This commitment was in keeping with the seriousness of the danger and the over-all situation. The situation has since changed. The threat remains but an even greater danger looms in the West: the Anglo-American landing! In the East, the vastness of the space will, as a last resort, permit a loss of territory even on a major scale, without suffering a mortal blow to Germany's chance for survival. Not so in the West! If the enemy here succeeds in penetrating our defences on a wide front, consequences of staggering proportions will follow within a short time. All signs point to an offensive against the Western Front of

I started shooting when I was much too far away. That was merely a trick of mine. I did not mean so much to hit him as to frighten him, and I succeeded in catching him. He began flying curves and this enabled me to draw near.

Baron Manfred von Richthofen, Leading Ace of WWI, German Air Service, 80 Victories

Europe no later than spring, perhaps earlier.

For that reason, I can no longer justify the further weakening of the West in favour of other theatres of war. I have, therefore, decided to strengthen the defences in the West, particularly at places from which we shall launch our long-range war against England. For those are the very points at which the enemy must and will attack; there - unless all indications are misleading - will be fought the decisive invasion battle.

Holding attacks and diversions on other fronts are to be expected. Not even the possibility of a large-scale offensive against Denmark may be excluded. It would pose greater nautical problems and could be less effectively supported from the air but would, nevertheless, produce the greatest political and strategic impact if it were to succeed.

During the opening phase of the battle, the entire striking power of the enemy will, of necessity, be directed against our forces manning the coast. Only an all-out effort in the construction of fortifications, an unsurpassed effort that will enlist all available manpower and physical resources of Germany and the occupied areas, will be able to strengthen our defences along the coasts within the short time that still appears to be left to us.

Stationary weapons (heavy AT guns, immobile tanks to be dug-in, coast artillery, shore-defence guns, mines, etc.) arriving in Denmark and the occupied West within the near future will be heavily concentrated in points of main defensive effort at the most vulnerable coastal sectors. At

the same time, we must take the calculated risk that for the present we may be unable to improve our defences in less threatened sectors.

Should the enemy nevertheless force a landing by concentrating his armed might, he must be hit by the full fury of our counterattack. For this mission ample and speedy reinforcements of men and material, as well as intensive training, must transform available larger units into first-rate, fully mobile general reserves suitable for offensive operations. The counterattack of these units will prevent the enlargement of the beachhead and throw the enemy back into the sea.

In addition, well-planned emergency measures, prepared down to the last detail, must enable us instantly to throw against the invader every fit man and machine from coastal sectors not under attack and from the home front.

The anticipated strong attacks by air and sea must be relentlessly countered by Air Force and Navy with all their available resources. I therefore order the following;

A) Army:

I.) The Chief of the Army General Staff and the Inspector General Staff and the Inspector General of Panzer Troops will submit to me as soon as possible a schedule covering arms, tanks, assault guns, motor vehicles and ammunition to be allocated to the Western Front and Denmark within the next three months. That schedule will conform to the new situation. The following considerations will be basic:

a) Sufficient mobility for all panzer and panzer grenadier divisions in the West, and equipment of each of those units by December 1943 with 93 Mark IV tanks or assault guns, as well as large numbers of antitank weapons.

Accelerated reorganisation of the 20 Luftwaffe Field Divisions into an effective mobile

reserve force by the end of 1943. This reorganisation is to include the issue of assault guns.

Accelerated issue of all authorised weapons to the SS Panzer Grenadier Division Hitler Jugend [In this month (November 1943) this division was converted to a Panzer division (12th SS)], the 21st Panzer Division, and the infantry and reserve divisions stationed in Jutland.

b) Additional shipments of Mark IV tanks, assault guns and heavy AT guns to the reserve panzer divisions stationed in the West and in Denmark, as well as to the Assault Gun Training Battalion in Denmark.

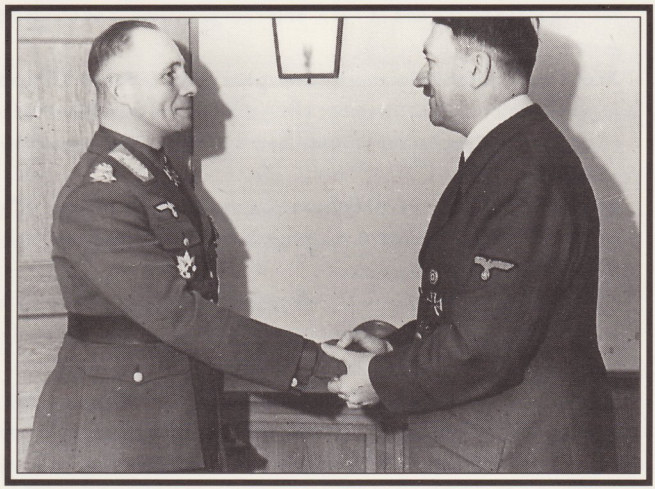
c) In November and December, monthly allotments of 100 heavy AT guns models 40 and 43 (half of these to be mobile) in addition to those required for newly activated units in the West and in Denmark.

d) Allotment of large numbers of weapons (including about 1,000 machine guns) for augmenting the armament of those static divisions that are committed for coastal defence in the West and in Denmark, and for standardising the equipment of elements that are to be withdrawn from sectors not under attack.

e) Ample supply of close-combat AT weapons to units in vulnerable sectors.

f) Improvement of artillery and AT defences in units stationed in Denmark, as well as those committed for coastal protection in the occupied West. Strengthening of GHQ artillery.

2.) The units and elements stationed in the West or in Denmark, as well as panzer, assault gun and AT units to be activated in the West, must not be transferred to other fronts without my permission. The Chief of the Army General Staff, or the Inspector General of Panzer Troops will submit to me a report through the Armed Forces Operations Staff as



Colonel General Rommel with Adolf Hitler

soon as the issue of equipment to the panzer and assault gun battalions, as well as to the AT battalions and companies, has been completed.

3.) Beyond similar measures taken in the past, the Commander in Chief West will establish timetables, conduct manoeuvres and command post exercises for the procedure of bringing up units from sectors not under attack. These units will be made capable of performing offensive missions, however limited. In that connection I demand that sectors not threatened by the enemy be ruthlessly stripped of all forces except small guard detachments. For sectors from which reserves are withdrawn, security and guard detachments must be set aside from security and alarm units. Labour forces drawn largely from

the native population must likewise be organised in those sectors, in order to keep open whatever roads might be destroyed by the enemy air force.

4.) The Commander of German Troops in Denmark will take measures in the area under his control in compliance with paragraph 3 above.

5.) Pursuant to separate orders, the Chief of Army Equipment and Commander of the Replacement Army will form Kampfgruppen in regimental strength, security battalions and engineer construction battalions from training cadres, trainees, schools and instruction and convalescent units in the Zone of the Interior. These troops must be ready for shipment on 48 hours' notice.

Furthermore, other available personnel are to be organised into battalions of replacements and equipped with the available weapons, so that the anticipated heavy losses can quickly be replaced.

B) Luftwaffe:

The offensive and defensive effectiveness of Luftwaffe units in the West and in Denmark will be increased to meet the changed situation. To that end, preparations will be made for the release of units suited for commitment in the anti-invasion effort, that is, all flying units and mobile Flak artillery that can be spared from the air defences of the home front, and from schools and training units in the Zone of the Interior. All those units are to be earmarked for the West and possibly Denmark.

The Luftwaffe ground organisation in southern Norway, Denmark, north-western Germany, and the West will be expanded and supplied in a way that will - by the most far-reaching decentralisation of own forces - deny targets to the enemy bombers, and split

the enemy's offensive effort in case of large-scale operations. Particularly important in that connection will be our fighter forces. Possibilities for their commitment must be increased by the establishment of numerous advance landing fields. Special emphasis is to be placed on good camouflage. I expect also that the Luftwaffe will unstintingly furnish all available forces, by stripping them from less threatened areas.

C) Navy:

The Navy will prepare the strongest possible forces suitable for attacking the enemy landing Fleets. Coastal defence installations in the process of construction will be completed with the utmost speed. The emplacing of additional coastal batteries and the possibility of laying further flanking mine fields should be investigated.

All school, training and other shore-based personnel fit for ground combat must be prepared for commitment so that, without undue delay, they can at least be employed as security forces within the zone of the enemy landing operations. While preparing the reinforcement of the defences in the West, the Navy must keep in mind that it might be called upon to repulse simultaneous enemy landings in Norway and Denmark. In that connection, I attach particular importance to the assembly of numerous U-boats in the northern area. A temporary weakening of U-boat forces in the Atlantic must be risked.

D) SS:

The Reichsfuehrer-SS will determine what Waffen-SS and police forces he can release for combat, security and guard duty. He is to prepare to organise effective combat and security forces from training, replacement, and convalescent units, as well as schools and other home-front establishments.

E) The commanders in chief of the services, the Reichsfuehrer-SS, the Chief of the Army General Staff, the Commander in Chief West, the Chief of Army Equipment and Commander of the Replacement Army, the Inspector General of Panzer Troops, as well as the Commander of German Troops in Denmark will report to me by 15 November all measures taken or planned.

I expect that all agencies will make a supreme effort toward utilising every moment of the remaining time in preparing for the decisive battle in the West. All authorities will guard against wasting time and energy in useless jurisdictional squabbles, and will direct all their efforts toward strengthening our defensive and offensive power.

signed: Adolf Hitler

NIGHT FIGHTERS - THE END

On July 13 1944 an event took place that marked the beginning of the end of the German night fighter force, enabling the RAF to take a giant step towards mastery of the night skies. Making a navigational error, a crew of 7 Staffel NJG 1 landed their Ju88G-1 at Woodbridge in Suffolk. On board was SN-2 (an AI radar that, because it operated on a longer wavelength, was virtually immune to Window - the RAF's chaff radar disruptive 'foil' strip system) and Flensburg (a homer that was able to pick up emissions from the RAF Monica tail warning radar).

As a result of this invaluable prize, the RAF rushed a new type of Window into service which nullified SN-2, and Flensburg was rendered impotent by the virtually complete removal of the Monica tail warning radar. For the Germans, worse was to come: early in 1944 the RAF had formed a new specialised group, No 100, which took over the jamming cover for the main force and operated long-range Mosquitoes against the Luftwaffe night fighters. No. 100 Group aircraft carried a variety of equipment to blot out enemy radio and radar communication, including 'Mandrel' jamming transmitters; 'Jostle', a high-powered audio-jamming of R/T communications and 'Piperack' to jam SN-2. The excellent AI Mk 10 and an assortment of homing devices enabled the Mosquitoes to become a lethal thorn in the side of the Nachtjagdgeschwader despite their relatively small numbers.

DIVISIONS AVAILABLE TO GERMANY ON 6 JUNE 1944

(BASED ON GERMAN SITUATION MAPS)

Theater	Inf type	Pz type	Misc
Denmark	2	1+2 Brig	3
Norway	11		
Finland	10		
Eastern Front	122	25+1 Brig	17+1 Brig
OB SUEDOST (Balkans)	20	2	3
OB SUEDWEST (Italy)	17+1 Brig	7	1
OB WEST(France and Low Countries	41+1 Rgt	11	9
Zone of Interior	3+1 Brig	1+2 Brig	4+2 Brig
Total German Divisions	**226+2 Brig,**	**47+5 Brig**	**37+3 Brig 1 Rgt**

A squadron commander who sits in his tent and gives orders and does not fly, though he may have the brains of Soloman, will never get the results that a man will, who, day in and day out, leads his patrols over the line and infuses into his pilots the "esprit de corps."

Brig. General William "Billy" Mitchell, USAS

AXIS SATELLITES

DIVISIONS AVAILABLE TO GERMANY ON 6 JUNE 1944 (BASED ON GERMAN SITUATION MAPS)

Theater	Inf type	Pz type	Misc
Finnish, Eastern Front and Finland	14+8 Brig	1	1 Brig
Romanian, Eastern Front and Romania	17 + 5 Brig	1	2
Hungarian, Eastern Front and Hungary	9+2 Brig	2	5
Bulgarian, Occupation Duty in Balkans and Bulgaria	11		
Italian, In Zone of Interior	4		
Total Axis Satellite Divisions	**55+16 Brig**	**4**	**7+1 Brig**

Waiting for a proper moment to begin my evasive manoeuvre was agonising. Panic rose up in my throat, urging loss of reason. At the last moment I pulled up with eight Gs after breaking down and starboard. The missile couldn't take the turn, going off a thousand feet below.

Commander Randy "Duke" Cunnningham, USN

OVERLORD: THE CAMPAIGN

THE PRELUDE

The Allies, at the beginning of 1944, had a measure of numeric and technical superiority over the German forces. However, the upcoming 'invasion' of France required some sort of surprise as the whole operation could still end in catastrophe. Elaborate security precautions were thus taken and a comprehensive deception plan was worked out.

That an invasion was to be undertaken was pretty obvious to all concerned. The object of the security measures and the deception plan was to attempt to conceal the time and place of the operation from the Germans.

The plan was in two stages: first to lead the Germans to think that the landing was planned for the obvious area, the Pas de Calais; the second, even after the landing in Normandy had taken place, to cause them to believe that this was a diversionary operation to be followed by the 'real' landing in the Pas de Calais. So important was this considered that, during the whole period of the air preparation, for every target attacked in the assault area two other targets outside that area were dealt with.

The success of these measures may be judged by the fact that on June 6 the bulk of the German forces in France were north of the Seine. As far back as 1943 General Morgan had drawn attention to two problems upon the solution of which the operation might well depend; reduction of the German fighter strength and reduction of the German reinforce-

MURPHY'S LAWS OF COMBAT - 23.
Body-count math is 3 guerrillas plus 1 probable plus 2 pigs equals 37 enemy killed in action.

ment rate. By early 1944, there were some 13,000 aircraft in the UK, of which 11,000 were available for the support of Overlord. This figure included, however, nearly 3,500 heavy bombers in British Bomber Command and the United States 8th Air Force: they were working on a long-term plan for the destruction of German industry - particularly the oil industry - and were not under the command of the Supreme Allied Commander.

It would be natural to suppose that the entire weight of the 7,500 aircraft constituting the Allied Expeditionary Air Forces would have been available for these preparatory air operations. Unfortunately, this was not the case, for during the winter of 1943/44 German preparations for the 'flying bomb' campaign against London became increasingly obvious and considerable effort had to be diverted to action against the launching-sites. Nevertheless, the air effort available for these preliminary operations was colossal by any standards.

The success of the anti-Luftwaffe operation was almost complete: during the last two months the Luftwaffe lost a total of 1,858 aircraft and when D-Day came, air opposition was practically nil. By its nature, the Transportation Plan was unlikely to achieve so complete a success nevertheless, aided by the operations of the Resistance, it was undoubtedly a major factor in reducing the rate of arrival of German reinforcements round the bridgehead to an acceptable level.

As might be expected, the organisation of the actual assault was perhaps the most complicated problem the planners had to face.

To carry the overall total of 40-50,000 men with their vehicles and equipment, an armada of over 4000 landing ships, landing craft and barges of varying types was required; less than half of these were capable of crossing the Channel under their own power, the remainder having either to be towed or carried aboard the larger ships.

Only when all this had been done, did the Royal Navy assemble for the escort and support of the operation a fleet of over 1,500 vessels, ranging from battleships to armed landing-craft.

Although, from the point of view of the assaulting troops there was much to be said for an assault in darkness, both the navies and the air force had to have daylight to carry out their bombardment tasks and darkness would dangerously increase the likelihood of troops being landed in the wrong place. To assist navigation and for the airborne landings moonlight was essential. Finally, the German under-water beach obstacles meant that landing must be three to four hours before high tide. The only suitable periods for the operation therefore were those when there was four to five hours' daylight between dawn and high tide and, at the same time, good moonlight was available.

The question of rapid unloading initially appeared the most difficult of all; it could clearly not be done across the beaches as a long-term measure and the likeli-hood of capturing port facilities intact appeared small, at any rate in the early stages. The problem was solved by perhaps the most famous devices of the entire operation - the artificial harbours known as 'Mulber-ries'. They owed their existence primarily to the

About 3000 yds. directly ahead of me, and at the same level, a [Me 109] was just completing a turn preparatory to re-entering the fray. He saw me almost immediately and rolled out of his turn towards me so that a head-on attack became inevitable. Using both hands on the control column to steady the aircraft and thus keep my aim steady, I peered through the reflector sight at the rapidly closing enemy aircraft. We opened fire together, immediately a hail of lead thudded into my Spitfire. One moment the Messerschmitt was a clearly defined shape, its wingspan nicely enclosed within the circle of my reflector sight, the next it was on top of me, a terrifying blur which blotted out the sky ahead. Then we hit.

Group Captain Alan C. Deere, RAF,
22.5 Victories, WWII

MURPHY'S LAWS OF COMBAT - 30.
The only thing more accurate than incoming enemy fire is incoming friendly fire.

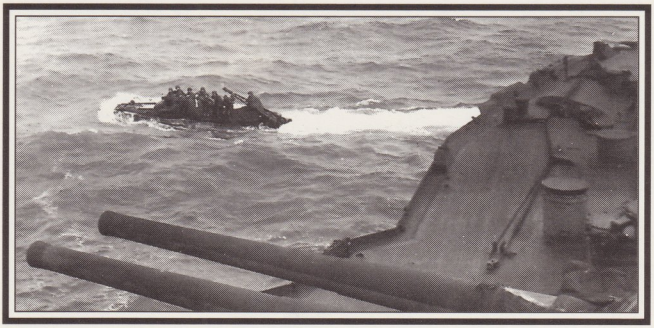
foresight of Churchill himself, who had directed their development as early as 1942, with his oft-quoted minute: 'They must float up and down with the tide... Don't argue the matter. The difficulties will argue for themselves.' They consisted of an outer breakwater formed partly of sunken blockships and partly of concrete 'caissons', 220ft long, which had to be towed across the Channel; in the area of sheltered water so created were floating piers adapted to take coasters, landing ships or barges; unloading was further assisted by a fleet of amphibious lorries known as DUKWs.

The supply of motor and aircraft fuel presented a particular problem. Initially tankers were moored offshore and the fuel fed by buoyed pipeline into depots on land. Preparations were made, however, for an underwater pipeline direct from England to the French coast - PLUTO or 'Pipe-Line-Under-the-Ocean' - and eventually, though not in the early stages,

British troops at Ouistreham, Normandy. D-Day 6 June 1944

fuel supply was in effect drawn direct from England. It must not be forgotten that the invasion was not just a British/American/Canadian operation. All of the Allies had a hand in it including the Dutch, Norwegians, Australians, Czechs, Poles, New Zealanders and, of course, the French themselves who supplied boats and a co-ordinated resistance campaign assisted by the SOE (Special Operations Executive).

The actual invasion was meticulously planned with accurate models of sections of the landing beaches which gave men a visual knowledge of their own roles. Practice landings, fine-tuning, methodical briefings and specially designed and prepared weapons all played their part in the detailed build-up to the final push.



A DUKW passes the USS Arkansas

A steadily increasing percentage of the young and inexperienced pilots were shot down before they reached their tenth operational flight—soon it was more than five percent.

Lt. General Adolph Galland, Luftwaffe

MURPHY'S LAWS OF COMBAT - 31.
If you take more than your fair share of objectives, you will have more than your fair share to take.

During the course of this increasingly difficult fight it was proved that the leader of the flight squadron only received full recognition if he asked nothing from his men that he was not prepared to do himself.

Lt. General Adolph Galland, Luftwaffe

NEPTUNE

Although the D-Day invasion itself was known as Operation Overlord, it is not so well known that the Channel crossing had its own label, Operation Neptune.

The sustained attacks from the air on the elaborate Early Warning System of the enemy had succeeded almost too well. In the entire Neptune area from Cap d'Antifer to Barfleur, 74 radar stations were out of action, and the 18 still capable of working were silent. But it was not enough to simply blind the enemy, it was important also to mislead. For this purpose 10 stations were deliberately left in working order north of the Seine and onto these screens the Royal Navy contrived to produce a misleading web of shapes and echoes.

There was no inclination on the part of the Allies to under-estimate the powers of the German army in the west. Thus, all through June 5 and the night, 105 aircraft of the RAF and 34 little ships of the Royal Navy contrived, by means of weaving patterns over the sky and sea and flying barrage balloons, to produce the 'echoes' in the enemy radars of a substantial fleet approaching the Pas de Calais. At the same time jamming operations and diversions were carried on against Cap d'Antifer and Barfleur. The silent approach of the great armada to spread out in a fan from eight to 12 miles offshore enclosing the Bay of Seine is the measure of success. Five beaches were designated as landing areas codenamed Utah, Omaha, Gold, Juno and Sword.

The invasion began with the dropping of paratroops. A haphazard affair which lead to the mass scattering of, for example, the 82nd Division. In fact, on the day the 82nd were 4000 men short and still only at one third strength three days later. Actually, this incoherent scattering amongst the enemy created so much confusion behind enemy lines as to prevent co-ordinated reinforcement at the landing beaches. In fact, by the time the US 4th Infantry Division came in to land the battle of Utah Beach was virtually won. The assault at Utah resulted in just 12 dead.

The struggle for Omaha was very different. Heavy enemy cross fire created havoc, while waves six foot high caused many landing craft to flounder. The DUKW's were overloaded and, in many cases, capsized losing much of the artillery. The landing craft carrying support tanks came upon similar problems. There is a devastating simplicity about disaster. There were no dry landings. The assault craft and the larger LCVPs and LCMs grounded on the sandbanks, slewed in the sand runnels and cast scores of men knee, waist and neck deep into seas lashed not only by the wind but by mortar bombs, shells and machine gun bullets. Many believe that General Bradley's refusal to utilise British-built specialised armour and weapons, made especially for the landing, formed a major contribution to the resultant chaos.

Why the refusal? Possibly, Bradley was unimpressed with British confidence and, in some cases, perceived (rightly or wrongly) arrogance. Whatever the reason the steady progress at the other beaches stood in stark contrast to Omaha.

As a fighter pilot I knew from my own experiences how decisive surprise and luck can be for a success, which in the long run only comes to the one who combines daring with cool thinking.

Lt. General Adolph Galland, Luftwaffe

Despite those other beaches having experienced similar physical conditions to Omaha Beach.

By midnight the deepest penetration was hardly a mile. In the central sector, specialised armour brought the British and Canadians swiftly over Gold and Juno Beaches and, by the afternoon, they were probing inland towards Bayeux and Caen. The Sword assault was equally rapid: by 1400 hours leading troops had reached Bieville and the Commandos were linking up with the paratroops. This proved a vital factor, for it was through the gap between

D-Day, 6th June 1944

Juno and Sword that the Germans made their one major counterattack - a battlegroup of XXI Panzer Division swept towards the coast, but turned back when British reinforcements were flown into the airborne troops behind it. From the beginning, the main weight of German resistance was on the Allied left flank and it was there that the German armour was pinned down, fortunately far from the precarious toe-hold at Omaha, which could have turned from a local disaster to a major crisis.

The Normandy beaches had been won; the first German counterattacks had been beaten off - and rapidly growing but still confined Allied armies had still to break out through the German ring into the interior of France. However, the Beach-head was now in place, the Allies were here to stay.

It is true to say that the first kill can influence the whole future career of a fighter pilot. Many to whom the first victory over the opponent has been denied either by unfortunate circumstances or by bad luck can suffer from frustration or develop complexes they may never rid themselves of again.

Lt. General Adolph Galland, Luftwaffe

FIRST OF MANY

Among the first Allied aircraft over Normandy on June 1944 were Typhoons of the 2nd TAF. Nine of the 18 squadrons in TAF were put on Air Alert and at any one time three squadrons were over the British and Canadian armies.

SADDLE RACKS

While the standard Typhoon rocket load was normally eight missiles, armament specialists had developed a 'saddle' mounting enabling a second row of rockets to be slung below the first. The use of the saddle enabled varying loads to be carried using either single or paired packs.

OVERLORD - THE COMMANDERS OF THE AIR

The air attacks precluding and during the day of 6th June 1944 were largely governed by nine air commanders: six on the Allied side and three on the German.

ALLIED COMMANDERS - AMERICAN

LIEUTENANT-GENERAL LEWIS H. BRERETON

Brereton commanded the Ninth Air Force, the American element of the Expeditionary Force. An aviator since 1913 and subordinate to 'Billy' Mitchell, the far-sighted commander devoted to air power, Lewis Brereton's first taste of significant command during WW2 was controlling US Far East Air Force under General MacArthur. A situation he found overwhelming,

"There was a comprehensive project on paper for the construction of additional airfields, but unfortunately little money had been provided prior to my arrival..."

The US surrendered Manila in 1942 and Brereton was transferred to the Tenth Air Force in India. He then moved to commanding the US Army Middle East Air Force where he co-ordinated strikes against enemy supply lines focusing on Benghazi, Tobruk and convoys around Greece and Crete in an effort to bolster the RAF's North African campaign.

Brereton's willingness to co-operate and learn from the British forces helped, with the newly named Ninth Air Force, to end the North African campaign, the invasion of Sicily and the entry in Italy. His integration of the best in USAF and RAF techniques enabled him to

produce a highly mobile force. Brereton streamlined his organisation making it highly effective.

He also initiated attacks on enemy supply lines. One conspicuous assault being the Ploesti oil refinery raids in Rumania which was largely successful despite navigation errors which

U.S. Troops pour ashore, note the Barrage Balloons, to protect the ships from low-flying enemy strafers.

The first rule of all air combat is to see the opponent first. Like the hunter who stalks his prey and manoeuvres himself unnoticed into the most favourable position for the kill, the fighter in the opening of a dogfight must detect the opponent as early as possible in order to attain a superior position for the attack.

Lt. General Adolph Galland, Luftwaffe

resulted in the loss of the leading aircraft.

When Brereton arrived in the UK late in 1943 his wide experience enabled him to mould the Ninth Air Force into a useful tactical command that would be supportive to Overlord operations. His previous willingness to blend British and US air plans, ideas and techniques were to prove highly useful for the Overlord campaign and proved a testament to a highly adaptable and committed commander.

LIEUTENANT-GENERAL JAMES H. DOOLITTLE

Doolittle commanded the US Eighth Air Force. An aviator since 1917 in the Army Air Service, Schneider Trophy winner in 1925 and Thompson trophy winner in 1932, Doolittle worked as an experimental engineer in the Air Corps Material Division and took a leading part in blind flying making the first successful flight on instruments. His work was recognised by his award of the Harmon Trophy in 1930.

Doolittle was an out-spoken advocate of air power and the formation of a separate air arm during the 1930s and during 1942, he undertook the highly daring mission to attack Tokyo from an aircraft carrier. The aim - to gain revenge on Pearl Harbour and provide a psychological boost for the USA.

His flight of 16 B-25 Mitchells (equipped with dummy guns to save weight and dissuade air attack) flew from the USS Hornet on 18 April, 1942. The

mission was a success and Doolittle was awarded the Congressional Medal of Honour.

After appointments in North Africa in 1942 commanding the Twelfth Air Force and the North-west African Strategic Air Force Doolittle was transferred to the Eighth Air Force where he provided for the integration of his heavy bombers into the overall pattern of air operations for Overlord.

GENERAL CARL SPAATZ

He was the Commander of the US Strategic Air Forces in Europe from January 1st 1944. After seeing the Luftwaffe's might first-hand during his stint in the UK as an official observer during the days of the Battle of Britain, Spaatz was familiar with the UK war situation when he returned to the UK in 1943 as Commanding General of the Eighth Air Force. Spaatz's B-17s landed at Prestwick on July 1, 1942. Targets just outside Rouen were the first aim, six weeks later. Spaatz learned all about attacking well-defended coastlines two days later when his unlikely termed 'reconnaissance in force' flight of B-17s and Spitfires paralysed the fighter station at Abbeyville-Drucat for two important hours. Lessons were learned that would hold Spaatz in good stead for Operation Overlord.

Before planning for Overlord became more intense, Spaatz aided General Montgomery's El Alamein offensive by providing his services as overall air commander - a post that was desperately required at the time.

I closed one eye holding the tip of my little finger up in front of the orb, blocking out just the fiery ball of the sun in front of my opened eye. I found that it was impossible for an enemy to come down from out of the sun on a moving target without showing up somewhere outside of my fingertip if I continuously kept the fiery part from my vision.

Colonel Gregory "Pappy" Boyington, USMC

Spaatz co-ordinated operations of the Eastern Air Command and the Twelfth Air Force, later the Mediterranean Air Command, in February 1943. He followed the campaign through to the invasion of Italy.

The planning stages of Overlord were to bring Spaatz into conflict with the British Commanders, Leigh-Mallory and Tedder. This lead to a quick cessation of all co-operation between Spaatz and Leigh-Mallory. The problem was that Spaatz wanted to help the Overlord campaign's strategic objectives with a combined bomber offensive as outlined in the Pointblank directive. He would, thus, require complete freedom of action and control. Leigh-Mallory was against this concept.

Although Spaatz and Harris were generally in agreement, their opinions diverged when it came down to the question of area bombing. Harris wanted it whereas Spaatz wanted to adapt the Pointblank directive to the needs of Overlord, This directive was known as the Oil Plan and was centred around attacks on oil installations. The whole idea of the Oil Plan was an intriguing one with many possibilities to tie up the German offensive. However Leigh-Mallory prevailed with his Transportation Plan as economic experts said that Spaatz's plan would not achieve its effects in time for the operation of Overlord. Although personality problems persisted, which included complaints to Eisenhower himself, Spaatz's oil offensive had begun by the back door before D-Day, with the Ploesti attack. Results on oil installations did, finally, change operational thinking and directives gave priority to oil targets with transportation second.

Spaatz was to end the war in command of the aircraft which dropped the two atomic bombs on Japan.

Acceleration is of key importance and often overlooked.

Lt. General Adolph Galland, Luftwaffe

ALLIED COMMANDERS - BRITISH

AIR CHIEF MARSHAL SIR ARTHUR TEDDER

Tedder was Deputy Supreme Commander for Overlord. 1941 saw Tedder as Air Officer Commanding-in-Chief, RAF Middle East. This role proved demanding in many ways, not the least because of Tedder's need to bridge the inter-service rivalries between the RAF and the Army. A role in which he was highly successful.

In fact, Tedder was no stranger to Eisenhower as he worked closely with him as the Commander-in-Chief of the new Mediterranean Air Command. Eisenhower, at the time, was Supreme Commander for Torch - the allied invasion of North Africa. Tedder's aim during the operation was to meld the air/land and sea operations. However, before the campaign towards the Italian mainland Tedder recognised the importance of Axis airpower to the German strategic plans. Hence, Tedder's concentration on anti-air missions along with communications operations. The ultimate invasion against Sicily, which used airborne troops for the first time, was completed with all enemy airfields out of action.

Churchill nominated Tedder for the Deputy post, to Eisenhower, because of his recognition in the importance of the air operations in the upcoming Overlord campaign.

Whenever you're over the lines you have to keep twisting your neck in all directions every minute, or you're sure to be surprised.

Captain Edward V. "Eddie" Rickenbacker, USAS, Leading US WWI Ace, 26 Victories

Tedder's appointment for the Overlord campaign was a popular one as many of the commanders subordinate to him were familiar faces. However, Tedder was immediately faced with a problem that concerned the command and role of the strategic bombers. The clashes in personality with Spaatz and Harris only backed up his initial worries about the need for co-operation,

"As I see it, one of the main lessons of the Mediterranean campaign was not merely the advisability of, but the necessity for, unified command of the Air Force. I know this is Eisenhower's view. I think everybody in authority, both British and American, realises that it is going to be hard work...to maintain harmonious co-operation during this next job. A split on the question of the control of air forces might well...precipitate a quite irremediable cleavage."

A compromise was sorted in the end. The upshot being that rivalries were ignored in favour of the factual evidence and a close examination of the resources available. Only one concentrated target attack would be successful, considering the time limits of Overlord. Hence Leigh-Mallory's Transportation Plan, the scheme to hit enemy communications was taken on board. Both Harris and Spaatz's plans were examined and rejected. Later, Tedder was able to persuade Spaatz to hit certain oil targets in an effort to draw the Luftwaffe. This was a good example of how Tedder was able to modify plans to maintain motivation.

Tedder's role in Overlord was an essential one. Eisenhower described him as "one of the few great military leaders of our time." Certainly Tedder's ability to work with his own subordinates, especially personalities like Spaatz and Harris, complete with tact and diplomacy to suite the circumstances helped to gel the allied air forces into an effective fighting force.

[Inexperienced] pilots are really blind in the air for the first couple of months.

Colonel Erich "Bubi" Hartmann, GAF, World's Leading Ace, Luftwaffe, WWII, 352 Victories

AIR CHIEF MARSHAL SIR TRAFFORD LEIGH-MALLORY

As Commander-in-Chief, Allied Expeditionary Air Force, Leigh-Mallory commanded No.12 Group during the Battle of Britain which defended the Midlands and east-coast shipping. An advocate of the 'big wing' theory of fighter tactics (ie: mass formations of fighters attacking enemy bombers before or after they have made their raid) Leigh-Mallory replaced Sir Keith Park as 11 Group's Commander switching the fighter operations to the offensive.

Leigh-Mallory replaced Sir W. Sholto Douglas as Air Officer Commanding-in-Chief, Fighter Command after the Dieppe landing in 1942 where valuable lessons were learnt over the mainly fighter-based support for the ground forces.

The selection of a fighter commander to Commander-in-Chief, Allied Expeditionary Air Force was approved by all concerned because of the realisation that air superiority would be required over the beachheads.

Leigh-Mallory was rejected by Churchill and Eisenhower as the overall Air Commander due to his rather aggressive and forceful attitude. Especially as this attitude conflicted with similar personalities within the Allied command structure. Leigh-Mallory's lack in heavy-bomber experience was another important factor. That is not to demean Leigh-Mallory's part in Overlord whose Transportation Plan formed the basis for air operations in the invasion. His skill in planning and administering the Allied air support was very important in the success of Overlord.

AIR MARSHAL SIR ARTHUR CONINGHAM

Commander, British Second Tactical Air Force, Coningham had served under Tedder early in the war when, in 1941, Coningham served as the Commander of the Western Desert Air Force. Coningham was a Commander very much in the Tedder mould in that, although he believed that air operations should be independent in their operations, he also believed in inter-service co-operation with active links being maintained with Generals Coningham, Ritchie and Montgomery during the desert operations in Africa. His far-sighted approach served him well during the advance through Tunisia and the invasion of Sicily as Commander of the Allied north-west African Tactical Air Force.

Any angles you give the bogey on the first pass will haunt you for the rest of the fight.

Lieutenant Jim "Huck" Harris, USN

For Operation Overlord Coningham was responsible for much of the operational planning and control of the Allied Expeditionary Air Force up to and including the opening phase of Overlord. His attacks on the bridges over the Seine (his own idea) contributed to the success of the operation.

MURPHY'S LAWS OF COMBAT - 33.
Professional soldiers are predictable, but the world is full of amateurs.

Coningham's tactical skill was a result of his innovation and bravery which was well used by Tedder. He allowed Coningham the freedom to exploit his own positive attributes.

With no war, we forgot about building airplanes you could see out of.

Colonel Erich "Bubi" Hartmann, GAF

AIR CHIEF MARSHAL SIR ARTHUR T. HARRIS

Harris was the AOC-in-C, Bomber Command. Born in South Africa, Arthur Harris flew as a pilot in World War 1. His career rose steadily during the 1930s until his most well-known posting as Air Officer Commanding-in-Chief, Bomber Command in early 1942. Harris, always an aggressive personality, was ideally suited to the needs of Bomber Command which, at one time, was lacking in morale and modern aircraft. He also changed the bombing directive from precision bombing to area bombing, initiating the highly successful 1000 bomber raid on Cologne. Harris, however, was rather suspicious of new ideas. For example, he was set against the 'bouncing bomb' used in the Dambuster raid, he feared the initiation of the Pathfinder force would create a divisive elite and he was against incendiary bombs for more standard weapons.

He supported Spaatz in his beliefs of a strategic offensive, although he disagreed in picking out specific targets (Spaatz wanted to target oil installations). The 'area' catch-all rule was the one he liked to follow. His disregard for those directives with which he disagreed, lead to personality problems. For example, he virtually ignored Leigh-Mallory who advocated the Transportation Plan. His loyalty was beyond reproach,

however. His handing over of Bomber Command to the tactful Tedder to initiate a plan which Tedder believed in but Harris did not, for example is a sample of that loyalty. Attacking the marshalling yards in the run up to D-Day was another task he felt Bomber Command should not have been involved with as he felt this effort diverted his more productive attentions from night area-attacks. The ultimate success in the final marshal yards raids substantiated Bomber Command's role in the D-Day build-up. Harris urged his crews to perform these missions to the best of their ability.

When attacked by much superior numbers I get the hell out of there using speed or clouds...and only as a last resort by diving to the deck....I do not like the deck....The danger from small arms ground fire...is great....Two-thirds of our Squadron losses have been from enemy small arms fire.

Lt. Colonel John C. Meyer, USAAF

His problems with Allied directive, especially the later decision to target oil installations, grew to new heights as he virtually ignored the order. This caused severe tension between Harris and Air Chief of Staff Portal. Harris, at one point (early 1945), even offered to resign his commission. A suggestion that was impossible to accept given the precarious state of the war at the time.

Harris's commitment to winning the war was total. He had his own ideas of doing it, though. This stubbornness lead to the strengthening of Bomber Command into a superb fighting force and Harris was looked upon as an inspiration by the men who served under him. He was ruthless in his approach, witness the bombing of Dresden. However, he believed that these actions prevented a large number of British lives being lost.

GERMAN AIR COMMANDERS

GENERALMAJOR DIETRICH PELTZ

Peltz was a major-general by the age of 29. He had commanded Luftwaffe dive-bombing and bomber units during the 1940-41 assault on England and, later, low-level fighter-bomber attacks on English towns.

Commander Fliegerkorps IX which controlled all the Luftwaffe long-range units was based in northern France and supplied by units in Italy which were being withdrawn from that country. Peltz launched the last major bombing offensive on England in early 1944 after the destruction of Hamburg. The attacks had no meaningful effect on British morale.

Peltz was responsible for the creation of German Pathfinder units similar to those created by RAF's Bomber Command.

Peltz's last major action took place in 1945 during the Ardennes offensive when he threw 800 fighters and fighter-bombers at the Allies. Lack of training amongst his pilots severely hampered any chance of success for his units.

It is a code of honor to help out any comrade who is in distress, and no matter how serious the consequences may seem, there is only one thing to do--dash straight in, and at least lend moral support to him.

Lt. Colonel W.A. "Billy" Bishop, RAF

GENERALFELDMARSCHALL HUGO SPERRLE

Sperrle was in direct confrontation with the Allies during the D-Day landings as Commander-in-chief of Luftflotte 3 in France and Belgium.

Previously he had been joint leader with Kesselring of the Luftwaffe forces during the Battle of Britain. Before that he was associated with the

Nazi deployment of air power in the Spanish Civil War as first commander of the Condor Legion in 1936.

GENERALLEUTNANT ADOLF GALLAND

A brilliant fighter pilot and a supreme tactician, Adolf Galland was General Jagdflieger until January 1945 when he was removed by Goring for political reasons and as a result of constant wranglings between the two men and Galland's insistent stance on protecting and standing up for his men. Galland achieved one of the highest ranks and most coveted decoration, the Oak Leaves with Swords and Diamonds to the Knights Cross of the Iron Cross.

Galland survived the war after being shot down by a P-51 Mustang during a six-ship Me262 mission against B-26 Marauders over Riem airfield near Munich.

Adolf Galland

LIFE? DON'T TALK TO ME ABOUT LIFE...

"The weather was not good for invasion last week along the coast of Normandy." So began LIFE's 13-page coverage of D-Day - June 6, 1944 - a decisive turning point in the war against Hitler's Germany. It took the largest armada in history, some 5,000 ships and 150,000 men, to launch "a 53-year-old Kansan with a crooked grin" onto our cover. On D-Day plus one the Supreme Commander of the Allied Expeditionary Force, Dwight David Eisenhower, first visited the French beaches. Five days later he crossed the English Channel again bringing with him what LIFE called "an astonishing concentration of four-star commanders." Then, in mid-June, he was joined in a tour of the front by his newly commissioned son John, 21. Ike would go on to become the first head of the North-Atlantic Treaty Organisation (NATO) and a two-term President of the US. He would also, throughout the next quarter century, make our cover 19 more times, a record for the weekly magazine.

LIFE MAGAZINE

Dwight David Eisenhower

THE DIRECTIVE TO THE SUPREME COMMANDER, ALLIED EXPEDITIONARY FORCE

The following document was the directive given to Gen. Eisenhower, as the Supreme Commander, drawing up his duties just prior to the Normandy invasion.

1. You are hereby designated as Supreme Allied Commander of the forces placed under your orders for operations for liberation of Europe from Germany. Your title will be Supreme Commander Allied Expeditionary Force.

2. Task. You will enter the continent of Europe and, in conjunction with the other United Nations, undertake operations aimed at the heart of Germany and the destruction of her armed forces. The date for entering the Continent is the month of May, 1944. After adequate channel ports have been secured, exploitation will be directed towards securing an area that will facilitate both ground and air operations against the enemy.

3. Notwithstanding the target date above you will be prepared at any time to take immediate advantage of favourable circumstances, such as withdrawal by the enemy on your front, to effect a re-entry into the Continent with such forces as you have available at the time; a general plan for this operation when approved will be furnished for your assistance.

4. Command. You are responsible to the Combined Chiefs of Staff and will exercise command generally in accordance with the diagram at Appendix. Direct communication with the United States and British Chiefs of Staff is authorised in the interest of facilitating

your operations and for arranging necessary logistical support.

5. Logistics. In the United Kingdom the responsibility for logistics organisation, concentration, movement and supply of forces to meet the requirements of your plan will rest with British Service Ministries so far as British Forces are concerned. So far as United States Forces are concerned, this responsibility will rest with the United States War and Navy Departments. You will also be responsible for co-ordinating the requirements of British and United States Forces under your command.

6. Co-ordination of operations of other Forces and Agencies. In preparation for your assault on enemy occupied Europe, Sea and Air Forces agencies of sabotage, subversion and propaganda, acting under a variety of authorities are now in action. You may recommend any variation in these activities which may seem to you desirable.

7. Relationship with United Nations Forces in other areas. Responsibility will rest with the Combined Chiefs of Staff for supplying information relating to operations of the Forces of the USSR for your guidance in timing your operations. It is understood that the Soviet Forces will launch an offensive at about the same time as OVERLORD with the object of preventing the German forces from transferring from the Eastern to the Western Front. The Allied Commander in Chief, Mediterranean Theatre, will conduct operations designed to assist your operation, including the launching of an attack against the south of France at about the same time as OVERLORD. The scope and timing of his operations will be decided by the Combined Chiefs of Staff. You will establish contact with him and submit to the Combined Chiefs of Staff your views and recommendations regarding operations from the Mediterranean in support of your attack from the United Kingdom. The Combined Chiefs of Staff will place under your command the forces operating in Southern France as soon as

you are in a position to assume such command. You will submit timely recommendations compatible with this regard.

8. Relationship with Allied Governments - the re-establishment of Civil Governments and Liberated Allied Territories and the administration of enemy territories. Further instructions will be issued to you on these subjects at a later date.

THE ATA PILOT

*"Gradually faults in the [Typhoon's] Sabre engines were cured and we had fewer problems, and they were eventually deemed safe enough for the ATA to collect them. We had one tragedy with an ATA pilot who, against our advice, insisted on taking off on the grass. We told him it was wet and boggy, but he wouldn't listen and he taxied to the west side of the field. When he ran up the engine, the wheels dug in and the Typhoon turned over on its back on top of the cockpit hood. With shouts of "serve the arrogant *****r right", we ran across the field to find he had drowned in three inches of water, having had his head pushed into the bog with the aeroplane on top. It was a ghastly moment for everyone, and after that we always made sure that the visiting pilots did as they were told."*

Peter Cadbury

[Flew with the Fleet Air Arm until transferred to test pilot duties for MAP in 1942. Later Director of ITN and Chariman of Preston Publications]

PATTON: TALKING TO THE THIRD ARMY - JUNE 1944

Major General Cook introduced Lieutenant General William H. Simpson (whose Fourth Army was still in the USA, preparing for its overseas voyage to the front). General Simpson spoke briefly: "We are not here for you to listen to me, but to the man who will lead you into whatever is to be faced, with heroism, ability and foresight. He is a man who has proven himself many times amid shot and amid shell. My fondest hope is that some day I may have he privilege bringing my own army to fight beside his.

General Patton arose and stepped swiftly to the microphone. The men arose to their feet, standing silently. General Patton then surveyed the sea of brown. Grimly: "BE SEATED" - his words, not a request, were a sharp command. His voice was high and clear:

"Men: This stuff some sources sling about as talk about America wanting out of this war - not wanting to fight - is a lot of b******t. Americans, traditionally, love to fight! All real Americans love the sting and clash of battle! When you - every man of you here - were kids, you all admired the Champion: the champion marble player, the fastest runner, the handiest boy with his fists, the big league baseball player. Americans love a winner! Americans do not tolerate a loser! They despise cowards! Americans play to win - all the time and every time. I wouldn't give a hoot in hell for a man who lost and laughed. That's why Americans never lost - and will never lose - a war. The very THOUGHT of LOSING is hateful to Americans!

All you men aren't going to die. Only two percent of you, right here today, will die in a major

battle. Death, in time, comes to all - it must not be feared. Yes, every man is scared in his first battle. And if he says he isn't, he is just a God-damned liar! Some are f*****g cowards - yes, but they must fight just the same, or they will get hell slammed out of them watching men fight who are just as scared as they are. The real hero is he man who fights, even though he is scared. Some men get over their fright in a minute under fire - for others, it takes days. But the real man never lets fear of death overpower his honour, his sense of duty to his country and his manhood.

Throughout all your army careers, you men have bitched about what you call 'chicken s**t drill' - and like everything else in the Army, that has a definite purpose: obedience to orders and to create constant alertness. These must be bred into every man. I don't give a damn for any man who is not always on his toes. YOU are veterans or you wouldn't be here. You are ready for what is to come. To continue breathing - that is, to live - you must be alert ALL the time. If not, some German son of a b***h will sneak up behind you and beat you to death. [THE MEN ROARED]

There are four hundred nearly new marked graves somewhere in Sicily, all because one man went to sleep on the job. But they are GERMAN graves, because WE caught the b*****d asleep before his officers did!

An Army is a team. It lives, sleeps, eats and fights as a team. This individual hero stuff is a lot of s**t. The bilious bastards who write that kind of stuff for the Saturday Evening Post don't know any more about real fighting under fire than they do about f*****g."

[The men slapped each other in glee. Delighted howls of a Negro outfit carried above all. This was Patton as the men imagined him to be. He was in rare form. He hadn't let them down and was all he was cracked up to be. He had IT!]

"We have the best food, the finest equipment, the best spirit and the best fighting men in the world.

[The men roared their agreement. Patton snapped erect, faced his men belligerently and continued:]

Why, by God, I actually PITY some of those sons of b*****s we are going up against. Yes, by God, I do!"

[There would be many barracks tales about 'the old man's choice of phrases;' they would become part and parcel of Third Army history and the bible of their slang.]

"My men don't surrender. I don't want to hear of any soldier under my command being captured unless he has been hit. Even when hit, you can still fight - and that's not bulls**t, either! The kind of men I want under me is (like) the Lieutenant who, in Libya, with a slug in his chest, jerked off his helmet, swept the gun aside with one hand and busted hell out of the Boche with it! Then he jumped on the gun and went out and killed another German before he knew what the hell was coming off - and all the time this man had a bullet in and through his lungs. THERE WAS A MAN!

All the real heroes are not storybook combat fighters, either. Every single man in the army plays a vital part. Don't ever think that your role is unimportant. Every man has his job to do - he is a link in the great chain. What if every truck driver decided he didn't like the whine of shells overhead, turned yellow and jumped into the ditch? This bird COULD say to himself, 'Hell, they won't miss one guy in a million!' What would our country, our loved ones, our homes, even the world be? No! Thank God, AMERICANS do not think like that! Every man DOES his job. Every man serves the WHOLE. EVERY department, EVERY unit

is important in the vast scheme of this war! Ordnance men are needed to supply the guns and the machinery of war to keep us rolling. The Quartermaster brings up food and clothing - for, where we are going, there isn't a hell of a lot to steal! Every one of you - even the ones who heat the water to keep us from getting the GI s***s - has an important job to do!"

[Patton paused and half-turned to the officers behind him:]

"Even the Chaplain is important, for if we got killed and he wasn't there to bury us, we'd all go to hell. Every man must not think of himself alone, but also of his buddy fighting beside him. We don't want yellow cowards in THIS army! They should be killed off like rats. If not, they will go back home after the war and breed some more cowards! The brave men will breed more brave men. Kill off the God-damned cowards and we will have a nation of brave men!"

[The vast hillside stirred and thought of these words. Patton's personal banner, a great scarlet devil's head in a white field, waved triumphantly in the morning breeze. That banner would become the scourge of Central France and Germany to thousands of retreating Germans.]

"One of the bravest men I ever knew was in the African Campaign - one fellow I saw on top of a telegraph pole in the midst of furious fire. We were plowing toward Tunis. I stopped and asked what the hell he was doing up there at that time. He answered, 'Fixing the wire, sir.' 'Isn't that a little unhealthy spot right now?' I asked. 'Yes, sir, but the God-dammed wire has got to be fixed!' Now, there was a REAL soldier! THERE was a man who devoted all he had to his duty. It mattered not how great the odds, no matter how seemingly insignificant his duty might appear at the time. And, you should have seen those trucks on the road to Gabes. The drivers were magnificent! All day and night they rolled over the son

of a b******g roads - never stopping, never faltering from their course - shells bursting all around them all the time! WE GOT THROUGH ON AMERICAN GUTS! Many of those men drove over 40 consecutive hours; they weren't combat men but they WERE soldiers with a job to do! They did it - and in a whale of a way! They were part of a team! Without them, the fight would have been lost. All links in the chain worked and pulled together - and that chain became unbreakable!"

[The General paused. He stared challengingly out over the silent sea of men. A pin-drop could have been heard anywhere on that vast hillside.]

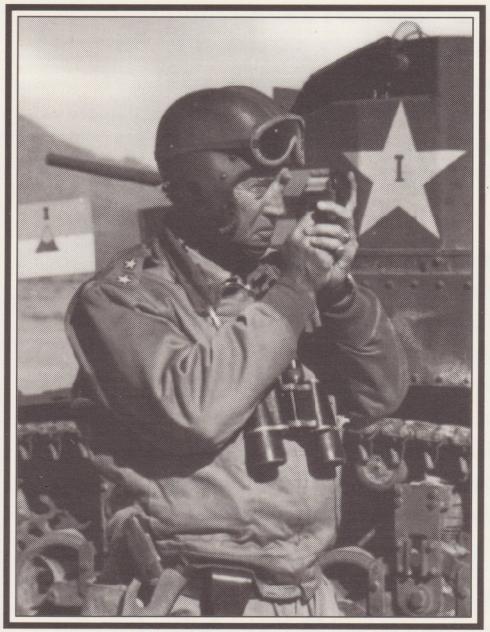
"Don't forget - you don't know I'm here. No word or fact of that is to get out or be mentioned in any letters. The world is not supposed to know what became of me. I'm not supposed to be commanding this Army; I'm not even supposed to be in England. Let the first b******s to find out be the God-damned Germans! Some day I want them to rise up on their hind legs and howl, 'Jesus Christ! It's that God-damned Third Army and that son of a b***h Patton again!'

We want to get the hell over there. We want to get this thing over with, then go home. But a war can't be won lying down. The quicker we clean up this God-damned mess, the quicker we can take a jaunt against the purple-p*****g Japs and clean their nest out, too, before the Marines get all the credit.

Sure, we want to go home; sure we want to get this thing over with. The quickest way to get it over is to GET THE B******S! The quicker they are whipped, the quicker we get home! The shortest way home is through Berlin!

When a man is lying in a foxhole, if he stays there all day a Boche will get him eventually.

TO HELL WITH THAT IDEA! My men won't dig foxholes. Foxholes only slow up offensives. Keep moving! Don't give the enemy time to dig in. We will win this war and win it by fighting and showing the Germans we have more guts than they have.



General Patton

There is one great thing you men will be able to say when you get home. You may thank God for it. Thank God - at least 30 years from now, when you are sitting around the fireside with your grandson on your knees - and when he asks what you did in the Great War, you won't have to cough and say that you shovelled s**t in Georgia!"

REQUIEM FOR A FIASCO

Sunday, November 15, a day Ken Small had long anticipated, dawned to gale force winds and torrential rains lashing the bleak seafront of Slapton Sands, England. The grey beach in South Devon was a mournful setting for the commemoration of a nearly forgotten tragedy. Just after 12:30 p.m. in the nearby village of Torcross, as Small stood proudly by and a group of 500 people huddled under umbrellas, a band struck up Amazing Grace. A US Army colour guard presented arms and a small stone memorial was unveiled beside a WW2 Sherman tank that had been pulled from the seabed offshore.

In that moment, 43 years of dark rumours and official neglect surrounding the deaths of at least 749 American GIs and 197 Navy men in an ill-fated battle drill called Exercise Tiger were formally laid to rest. The ceremony also was the culmination of Small's one-man crusade to honour the victims of a disastrous misadventure by the US and British wartime military. "Call my role what you like, it seemed fate, destiny," says the 51-year-old Englishman and owner of a local guest house. "This has taken 16 years and a lot of money, time and frustration, a lot of dreams and nightmares. But I never even remotely considered giving up. I knew that I just had to do it."

Until Small grabbed Exercise Tiger by the tail, the incident had remained wrapped in obscurity. In the pre-dawn hours of April 28, 1944, a flotilla of US LST troop carriers, loaded with thousands of troops and live

The smallest amount of vanity is fatal in aeroplane fighting. Self-distrust rather is the quality to which many a pilot owes his existence.

Captain Edward V. "Eddie" Rickenbacker, USAS, Leading US WWI Ace, 26 Victories

ammunition for a rehearsal of the D-day invasion of Normandy, were surprised and attacked by German torpedo boats. A series of command blunders had left the troopships so inadequately protected that more men died on this training manoeuvre for the Utah beach landing than on the actual D-Day assault. The bodies of hundreds of drowned servicemen washed ashore on Slapton Sands but since seaside communities in the area had been evacuated to make way for the invasion rehearsal, there were few civilian witnesses to the catastrophe. The pressing need for secrecy at the time - and official embarrassment later - kept the disaster out of the public mind, if not out of some history books. After the war, rumours that there had been an official cover-up and that GIs had been buried in mass graves became the stuff of local legend, though both rumours were repeatedly denied by US authorities and seemed to have no basis in fact. The incident was swamped at the time by the bigger news of D-Day. It was then forgotten until Small happened to stumble on evidence of Exercise Tiger while walking the beach near his home.

Every time your opponent attempts to dive at you or attack you in any way, the best thing to do is to turn on him, pull the nose of your machine up and fire.

Lt. Colonel W.A. "Billy" Bishop, Probably the Leading WWI RAF Ace, 72 Victories

A former police officer who had gone into a ladies' hairdressing business, Small had bought the guest house and moved to Torcross in 1967. He subsequently suffered a nervous breakdown and, after being treated with valium and electroshock therapy, was befriended by a local fisherman who got him interested in beachcombing as a relaxation. Early in 1972 he came across unexpended bullets, mines and shells washed up on the shore. Neighbours told him about Tiger's tragic outcome but the only official acknowledgement was a monument put up by the Americans

thanking the local people for leaving their seaside homes, which were frequently damaged by the elaborate invasion rehearsals. In the midst of his own troubles Small felt compassion for the fate of the American GIs whose lives were unnecessarily lost. Says he, "I thought to myself, 'Why did the American government put this here in 1954, 10 years after they had lost all these lives, with no mention of the lives?' It didn't seem right to me."

Small's budding interest found a focus shortly thereafter when he joined a local fisherman and two divers who were investigating an underwater object that had been snagging trawler nets a mile offshore. The sunken mystery turned out to be an American Sherman tank. "Of course I thought, 'Well, if I could acquire this thing and recover it, it would be a really fitting memorial to the men who had died,' says Small. "But thinking that was one thing and doing it was another thing entirely." For Small the memorial was becoming an obsession. He spent the next 2.5 years trying to wrest the tank from both the sand and the Pentagon bureaucracy, which refused to consider it abandoned even though the hulk had been left 30 years on the seabed. A US government official visited, trying to dissuade Small from the project, while the British War Office warned him that it was illegal in the UK for private individuals to own or import a tank. In 1974 Small nevertheless succeeded in purchasing the sunken Sherman from the US Treasury for $50. He next spent 10 years and $28,000 to have the tank salvaged. Just before the 40th anniversary of D-Day, the Sherman was finally floated to the surface and

Sometimes you miss with the first bullets and the tracers give you away.

Colonel Francis S. "Gabby" Gabreski, USAAF

> *I will not say that I fought this action ideally, but I led my formation to a fairly favourable firing position. Safety catch off the gun and rocket switches! Already at a great distance we met with considerable defensive fire [from the bombers]. As usual in a dogfight, I was tense and excited; I forgot to release the second safety catch for the rockets. They did not go off. I was in the best firing position, I had aimed accurately and pressed my thumb flat on the release button--with no result. Maddening for any fighter pilot!*
>
> *Lt. General Adolf Galland, Luftwaffe (During his last combat engagement, after eight years of combat and 104 victories)*

towed ashore. "Water was gushing from the hulk," recalls Small, "and a lady commented that it looked like the tank was crying."

The tank was restored and placed on a plinth and the town affixed a plaque dedicating it to the dead of Exercise Tiger. Still, Small wasn't satisfied. "Having done the tank," he says, "I decided that the ultimate must be the official American government recognition of this whole thing. I really took the bull by the horns."

Ex-US Army Major Attlee Wampler, whose tank battalion had operated the Sherman, invited Small to the US and introduced him to Congresswoman Beverly Byron (D-Md), whose father, Captain Harry Butcher, had participated in the Tiger manoeuvres as naval aide to the Allied Supreme Commander, Gen. Dwight D. Eisenhower. In January 1983, Byron introduced a bill in Congress for a US-sponsored memorial. Thinking to do some lobbying of his own, Small called the Pentagon, which he did inMay 1983 and was eventually connected with the office of Deputy Defence Secretary William Taft. Two days later he was invited to meet with Taft at the Pentagon, which he did May 1983. Taft offered his full support. Recalls Small, "One colonel said to me, 'Man, you've climbed one mountain of bureaucracy, and you've gone up and down the second, and now you're halfway up the third. How the hell you've done it I don't know.'"

Though the Slapton Sands ceremony was a tribute to Small's tenacity, he was by no means alone in his wish to remember the men of Exercise Tiger. Among the mourners that Sunday was Manny Rubin, 64, an American-born clothier who had married an English girl and made his home in nearby Plymouth after the war. He was a signalman second class aboard a landing ship the night of the disaster.

"According to sailing orders, we had a British destroyer on our starboard flank," he says. "I didn't learn until 40 years later that it never left port." The destroyer had been disabled, apparently after hitting another vessel, but the Allied Command nevertheless allowed the operation to go ahead. A British radar station detected German torpedo boats in the operations area, but the warning never reached the ships because their radios were tuned to a different frequency."

At 2 am the fast-moving German E-boats fell upon the flotilla in a surprise attack and Rubin saw two vessels explode after being hit by torpedoes. In the confusion the frightened soldiers on Rubin's ship even fired on one of their own troop carriers. Two of the troop-packed ships had sunk and Rubin's ship was eventually anchored near shore, when the light of dawn revealed a horrible tableau. "There were hundreds and hundreds of dead bodies," says Rubin. "Most of them didn't have a mark on them. They were just bobbing up and down, up and down. Some were black with oil, some were black groups burnt together. It was something out of hell." Many of the GIs

The man who enters combat encased in solid armour plate, but lacking the essential of self-confidence, is far more exposed and naked to death than the individual who subjects himself to battle shorn of any protection but his own skill, his own belief in himself and in his wingman. Righteousness is necessary for one's peace of mind, perhaps, but it is a poor substitute for agility...and a resolution to meet the enemy under any conditions and against all odds.

Major Robert S. Johnson, USAAF

drowned because they were wearing inadequate lifebelts instead of life jackets. Burdened by heavily loaded packs, they toppled helplessly into the sea. It was a costly lesson for military leaders. Six weeks later the use of life jackets saved untold lives when GIs hit the French beaches.

When the histories were written, however, the men of Tiger got very short shrift indeed. Ike and his generals never had much to say about the bungled operation. In fact, it's not clear that Ike ever knew exactly what had occurred. According to Captain Butcher's memoir, My Three Years With Eisenhower, the general was aboard a ship observing the rehearsal from a distance. He was disturbed by delays in the manoeuvres, yet left for his headquarters unaware of the tragedy. The scale of world war, after all, dwarfed even the losses at Slapton Sands.

A fitting tribute was therefore left to a more peaceful time, and in Ken Small's view even 43 years later was not too late. "I have done it all for those young men - scared, ignorant, untrained - who lost their lives," he says. "More so, I have done it for their friends and relatives back home in America."

It was clear, as the final notes of Taps died away in Torcross village, that the men of Exercise Tiger had finally received their due - and Ken Small had done his duty.

DROPPING IN

Lieutenant-Colonel Hoffman had just glanced at his watch. The time was 40 minutes past midnight. June 6 was less than three-quarters of an hour old. For the past hour there had been a continuous drone of aircraft above the battle headquarters of III Battalion, 919th Grenadier Regiment, east of Montebourg. The roar grew louder.

Hoffman stepped outside the bunker. He gave a start. Six giant birds were making straight for his battle headquarters. They were clearly visible, for the moon had just broken through the clouds. 'They're bailing out.' For an instant Hoffman thought the aircraft had been damaged and its crew was going to jump. But then he understood. This was an airborne landing by paratroops. The white mushrooms were floating down - straight at his bunker.

'Alarm! Enemy paratroops!' The men at III Battalion headquarters had never pulled on their trousers so fast before.

'Alarm! Alarm!'

The sentries' carbines were barking. They were firing at the parachutes floating down from the sky. Then the moon hid itself. Darkness enveloped the descending army. Hoffman grabbed a rifle. Then the darkness was rent by the first burst of fire from an American submachine-gun.

The battle for Normandy was on.

AIRBORNE TROOP SONGS

PARATROOPERS' SONG.

This song is subtitled, "The New Infantry March."

Oh, it used to be the Infantry
Did nothing but march all day;
These dusty guys, with mud in their eyes
Went slogging along their way.
But times have changed
And now we range
The sea and the sky of blue;
We fly a bit, and then we hit
The silk of a parachute, OH...

(CHORUS)
Airborne we fly the sky,
Paratroopers, do or die.
Ski troops like the wind we go—
We're sons of guns, we're sons of guns,
We won't take "no" for an answer.
Can't stop those paratroops
Hurtling down into the fray.
Oh, it's not the way it used to be—
A bigger and better Infantry
Comes in by air today.

Fly with the head and not with the muscles. The fighter pilot who is all muscle and no head will never live long enough for a pension.

Colonel Willie Batz, GAF, 237 Victories, WWII

MURPHY'S LAWS OF COMBAT - 12.
If you are forward of your position, the artillery will fall short.

BEAUTIFUL STREAMER.

I think this one is nearly as imaginative as "Blood on the Risers."
(Sung to the tune of "Beautiful Dreamer")

Beautiful streamer, why should you be?
Blue skies above me and no canopy.
Billowing white silk is what I should see.
Beautiful streamer, please open for me.

Beautiful streamer at least fill in part,
Even a Mae West would give me a start.
Plummeting earthward, falling too fast—
I have the feeling my future just passed.

Beautiful streamer, please hear my song.
I have already counted too long.
Wouldn't have counted nearly so high
'Cept that my ripcord is caught in my fly.

Beautiful streamer, please help me rip her.
Don't let me die just because of a zipper.
Jumpmaster should've told me when trying to seat us,
He must have noticed me bent like a foetus.
Beautiful streamer, I'd like to mention
Shouldn't a soldier die at attention?
No use of hoping, now it's too late,
But this is no posture for St. Peter's gate.

UNDER ATTACK

"So what the hell...? In a flash I glance round, and then instinctively duck my head. There is a Thunderbolt sitting right on my tail, followed by seven more. All open fire. Their salvoes slam into my plane. My right wing bursts into flames. I spiral off to the left into the clouds. A shadow looms ahead: it is a Thunderbolt. I open fire. Its tail is soon in flames."

Heinz Knoke

THE GODDAMNED RESERVES.

This is a somewhat updated version of an old song. (Sung to the tune of "My Bonnie Lies Over the Ocean")

Chorus:
Call out, call out
Call out the goddamned reserves,
Call out, call out,
Call out the Goddamned reserves.

Oh, regulars are happy in peacetime,
Our freedoms they're proud to preserve.
But just let them get into trouble,
Then call out the goddamned reserve.

(Chorus)
They truly love overseas stations,
In Europe they're anxious to serve.
But if its Saigon or Korea,
Then call out the goddamned reserve.

(Chorus)
Fort Benning is filled with instructors,
With medals and badges galore.
They're surely our best combat leaders,
Except when the country's at war.

(Chorus)
At Campbell they're trained and they're ready.
They're tough and their muscles are hard.
But if there's gonna be shootin',
Then call out the National Guard.

(Chorus)
Fort Bragg is delightfully pleasant.
Each GI has the time of his life.
He'd gladly take his turn in Korea,
If he could just take his girl or his wife.

(Chorus)
God bless the regular Army.
It's truly a life to admire.
But if there's gonna be fightin',
Then now is the time to retire.

(Chorus)

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I FLEW FOR THE FUHRER ..... HEINZ KNOCKE - EVANS

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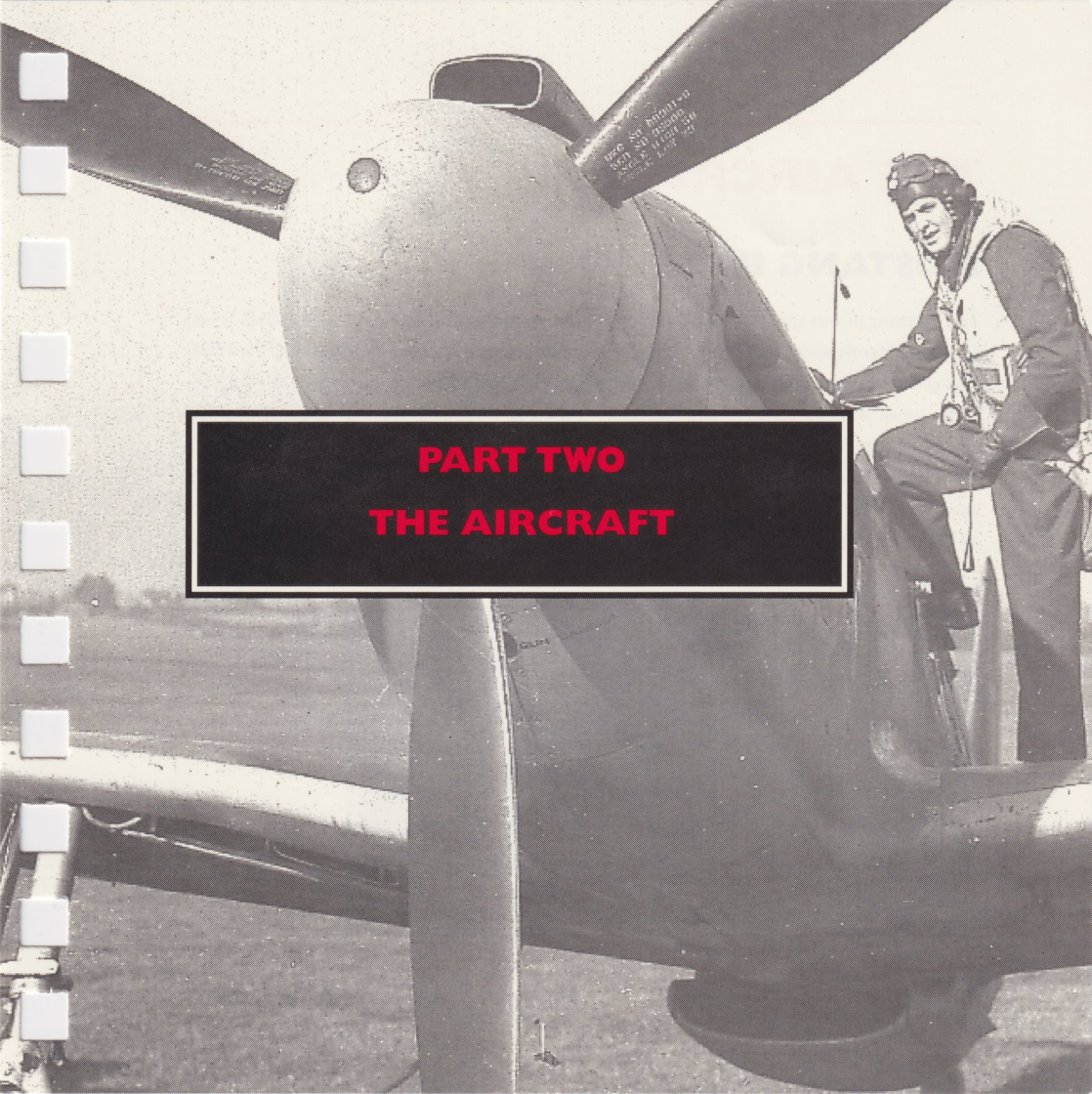
TYPHOON/TEMPEST IN ACTION ..... JERRY SCUTTS - SQUADRON SIGNAL

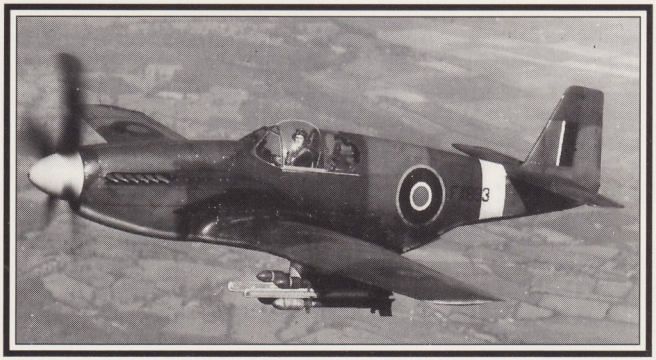


PART TWO
THE AIRCRAFT

THE AIRCRAFT

MUSTANG III

The Mustang III was the RAF's designation for the equivalent USAAF mark, the P-51B. It was a superb aircraft with a roll rate only slightly worse than the excellent Focke-Wulf Fw 190A. The greatest advance in the Mk. III over the Mk.I (which had been in service in the RAF for some time) was the fitting of the Merlin 63 engine and a four-bladed airscrew. The initial engine change took place in the UK by Rolls-Royce. This success was taken by North American who redesigned the P-51 to take the Packard 1520hp V-1650-3. This engine was basically a Merlin 63 with a two-speed, two stage supercharger and aftercooler. The airframe was also beefed up to take the new engine, there was a new radiator installed and



P-51B
Mustang III

a set of new ailerons were fitted to improve roll rate.

The RAF's Mk IIIs were rather unique in that they used the Malcom hood. This was a backward-sliding bulged cockpit hood which was an advancement over the older hinged style.

The RAF had complained about some American aircraft cockpits saying that they were overly large. However, the Mustang III was a welcome exception to that rule. Taxiing was a little bit awkward due to the tail-sitting approach of the design. However, that problem was ameliorated due to the tail-wheel being able to be locked to the rudder bar. Hence, the Mustang was swung side-to-side in order for the pilot to see where he was going. During initial take-off the Mustang was totally blind looking forwards. However, only a small amount of boost was required for a comfortable take-off. Flight performance was very good indeed with mild stall characteristics. Although, with a fuel tank attached the aircraft was longitudinally unstable. Landing the Mustang was rather more difficult than the Spitfire as the forward view was poor and the under-carriage's high rebound ration made a three-point landing tough. In fact, the poor forward view prevented the Mustang becoming carrier capable even though the US Navy underwent extensive trials. The Mustang III was very useful in the later stages of the war as a V-1 chaser, along with the Spitfire XIV and Tempest V.

Performance means initiative - the most valuable moral and practical asset in any form of war.

Major Sholto Douglas, RAF

PHOTO MUSTANGS

One of the lesser known Mustang variants, the F-6A, played a significant role in the D-Day landings. F-6A (a camera loaded, Allison-powered, P-51A) aircraft from the 107th TRS (Tactical Reconaissance Squadron), operating out of Middle Wallop, flew 67 missions and took 9,500 photographs over the intended landing beaches without losing a single aircraft. Every inch of the Normandy beaches was photographed from a height of 3,000-6,000ft. Further missions, against 'No-Ball' V1 sites, were also accomplished.

After the D-Day landings the 107th moved to Landing Strip A4 (at Deux Jumeaux) and then Landing Strip A9 (at Moley) swapping their F-6As for F-6C/Ds (the Merlin powered P-51C/D variant). They continued to carry out valuable reconassianse work including action at the time of the Battle of the Bulge.

Mustang III with 20mm cannons

Mustang Cockpit

Nothing is more exhilarating than to be shot at without result.

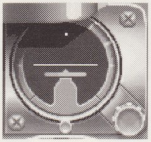
Sir Winston Churchill, 1898

Mustang cockpit items - 1

Airspeed

Altimeter

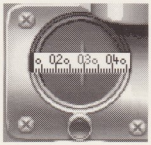
Auto Pilot and
Auto Trigger



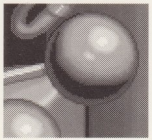
Bank

Clock

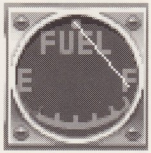
Combat Boost
& Sensitivity



Compass



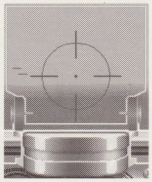
Flaps



Fuel

Mustang cockpit items - 2

Gear & Wheel Brake



Gunsight

Internal & External Fuel Supply

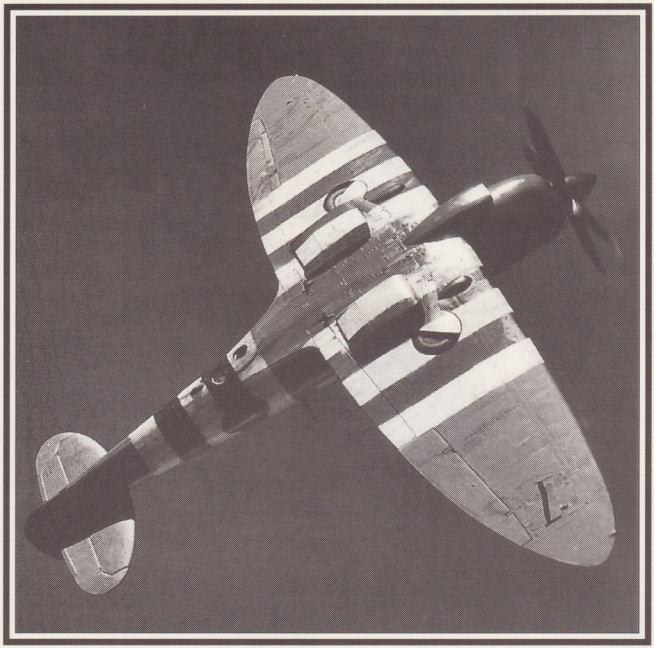
Tachometer

Turn & Slip

Vertical Speed

Video Ram (used/unused) & Video Ram Light

Remaining Selected Weapon & Weapon Select



Spitfire XI

"I loved the Spitfire , in every one of her many versions. But it has to be admitted that the later marks did not handle quite so nicely as the earlier ones had done. One test of manoeuvrability was to throw her into a flick roll and see how many times she rolled. With a Mark II or Mark V one got two and half flick rolls, but the later Mark IX was heavier and you only got one and a half; with the later and still heavier marks one got even less. Similarly with the earlier versions one could take off and go straight into a half loop and roll off the top, but the later Spitfires were much too heavy for that. The essence of aircraft design is compromise and an improvement at one end of the performance envelope is rarely obtained without a deterioration somewhere else."

Alex Henshaw, MBE, Production Test Pilot

SPITFIRE MK.IX

Essentially, the Spitfire Mk.IX was designed as a stop-gap until a number of Mk.VIIIs could be designed and built. Initially, trials had been completed using a Mk.III with the latest Merlin 61 engine. The RAF wanted an operational Spitfire/Merlin 61 combination into service immediately following the realisation that the Spitfire V was outclassed by the Focke-Wulf Fw190. However, to get the new fighter, the Mk.VIII, into the air required some re-tooling including a stronger airframe, additional fuel and a retractable tail-wheel. This would take time, too much time for the RAF who demanded a stop-gap to fill the breach. Enter, the Mk.IX. Although under-stressed, the new aircraft could handle the new Merlin. The Spitfire's performance received an immediate boost. See the comparitive performances on page 115 with the Focke-Wulf Fw 190.

The production Mk.IXs rolled off the lines in June 1942. One of the first Mk.IX flights was a specialist squadron formed to hit high altitude Junkers Ju 86R bombers. Although bereft of a pressurised cabin, the stripped Mark IX was able to achieve the required interceptor height. Armament was reduced to two 20mm cannons for weight reasons. Even the propellor was changed to a new light-weight version.

The only Mk.IX Spitfire to perform without any guns at all was the PR IXs, the reconnaissance version, painted in 'PRU Blue', and first used in November 1942. Those Mk.IXs that fought during the run-up to D-Day, however, were rather different from the early production versions. These Spitfires had a differently shaped, rather straighter rudder, the E-Type wing containing either 4 x20mm cannons or 2 x 20mm cannons and two .5-inch Brownings. Two, rear mounted, internal fuel tanks and a tear-drop canopy were also added.

THE THIN WING

"Why was the Spitfire so good? I think it was because it had such a thin wing. Of course, Mitchell had been meticulous in his attention to design of the Spitfire; but basically the reason for her ability to remain in the forefront of the technological race for so long was the fact that she had a thinner wing than that of any of her contemporaries"

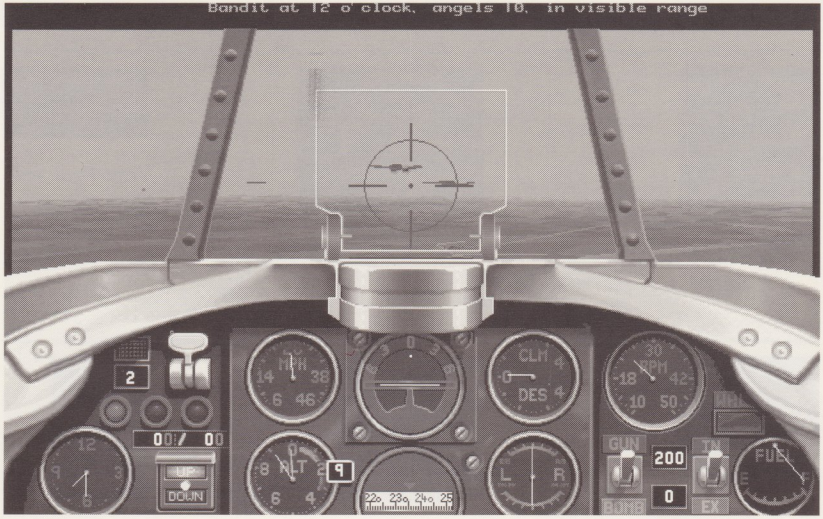
Sir Morien Morgan, Aerodynamicist, RAE Farnborough

AMERICAN SPITS

"...the Squadron received some exciting news: we were to re-equip with the new Mark IX Spitfire. I made my first flight in one on the 26th; she was a beauty. While the old Mark V became mushy above 20,000 feet as the engine power began to fall away, the Mark IX with her more powerful Merlin and two stage supercharger just seemed to go on and on up"

SECOND LIEUTENANT ERVIN MILLER, EAGLE SQUADRON, EIGHTH AIR FORCE

Spitfire IX



Spitfire IX
Cockpit

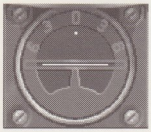
> ***He who sees first, lives longest.***
>
> ***Unknown***

Spitfire cockpit items - I

Airspeed

Altimeter

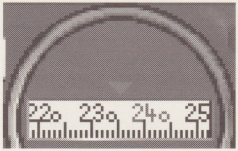
Auto Pilot and
Auto Trigger



Bank

Clock

Combat Boost
& Sensitivity



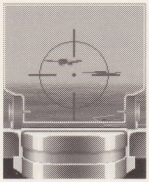
Compass

Flaps

Fuel

Spitfire cockpit items - 2

Gear



Gunsight

Internal & External Fuel Supply

Tachometer

Turn & Slip

Vertical Speed

Video Ram Light

Video Ram (used/unused)

Selected Weapon Total

Weapon Select

Wheel Brake

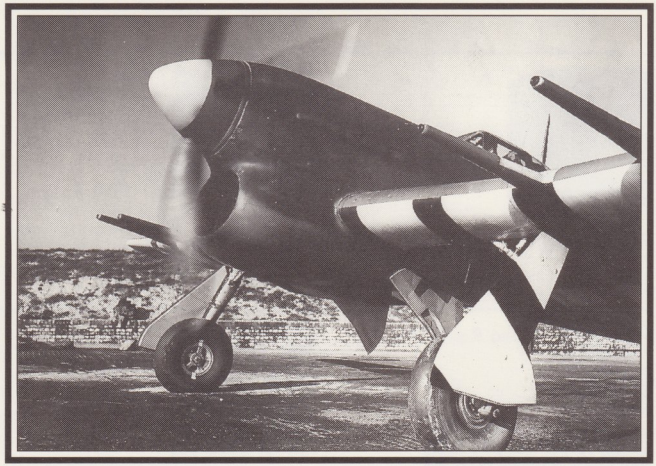
HAWKER TYPHOON IB

The Typhoon, it was often said, sorted the men from the boys. Pilots called it many names: monster and beast were among them. Whatever the names, the Typhoon became a most successful ground attack fighter during WW2.

The Typhoon had actually been slated, by Hawker's Sidney Camm, as a fighter. The early years of the aircraft were troublesome, in fact the whole project was under threat of extinction until the emergence of the Fw 190A. So, far from being shelved, the Typhoon project was accelerated.

The important thing in aeroplanes is that they shall be speedy.

Baron Manfred von Richthofen



Typhoon IB

However, the whole project nearly came crashing down when the Typhoon began to experience disasterous structural failures. Specifically, the entire tail structure collapsed, on several occasions, during recovery from a dive. The main problem was that lengthy structural tests during the war were just not possible - especially, in this case, when Fw 190s were eating away at the finite Squadrons of Spitfire Vs! Another problem was the seepage of carbon monoxide into the cockpit - the continual wearing of an oxygen mask became standard practice very quickly afterwards.

In the air, the Typhoon proved a valuable asset against Fw 190s at low level but flew like a pig at 20,000ft plus. The Typhoon was branded a failure as an interceptor. This fundamental weakness brought an amazing turn-around in its fortunes from interceptor to ground attack aircraft fitted with rockets and 20mm cannon.

As D-Day approached, Typhoons switched their attacks to shore installations all along the French Channel coast. The 'No-Ball' sites, radar installations and gun emplacements were harried and often damaged. As a prelude to the actual landings, Typhoons of Nos. 198 and 609 Squadrons on 2nd June 1944 destroyed the vital radar installation of Dieppe/Caudecote with bombs and gunfire, and as part of the preliminary air assault 26 Typhoons of Nos. 174, 175 and 254 Squadrons eliminated the Joburg radar site which would have covered the actual landing areas. The astonishing element of surprise achieved on D-Day has seldom been adequately attributed to this attack - yet its success must have been a key factor in the Allies ability to gain a foothold on the mainland. Certainly the Luftwaffe was deprived of all local fighter control over the landings.

There are no eyes for your backside, no eyes for who is coming from below...if you are single you have too many blind spots.

Colonel Erich "Bubi" Hartmann, GAF

Typhoon cockpit

When one has shot down one's first, second or third opponent, then one begins to find out how the trick is done.

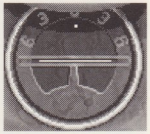
Baron Manfred von Richthofen, Leading Ace of WWI, German Air Service, 80 Victories

Typhoon cockpit items - 1

Airspeed

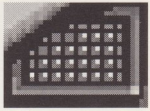
Altimeter

Auto Pilot and
Auto Trigger

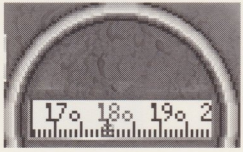


Bank

Clock



Combat Boost



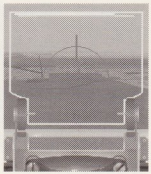
Compass

Flaps

Fuel

Typhoon cockpit items - 2

Gear



Gunsight

Internal & External Fuel Supply

Tachometer

Turn & Slip

Vertical Speed

Video Ram Switch & Video Ram (used/unused)

Weapon Select

Wheel Brake

DON'T TELL ANYONE!
At last, I was posted to RAF Tangmere, one of the great Battle of Britain airfields in England. Initially I flew Hurricanes, a wonderful aeroplane, steady as a rock. It has become a great mystique that the Spitfire won the Battle of Britain, but the RAF didn't have so many Spitfires then and there were twice as many Hurricanes. The mystique of the Spitfire even extended to the Germans. The great Peter Townsend once told me of an occasion when he was able to visit in hospital a German pilot he had shot down. "I am glad to meet the Spitfire pilot who shot me down," the man said. "No, no," said Peter, "I was flying a Hurricane!" The man took a lot of convincing, but finally said, "Well, if you ever meet any of my friends, please tell them it was a Spitfire that shot me down!"

James A. Goodson [Flew for 416 Squadron RCAF as a sergeant pilot and transferred to the USAAF to 133 Eagle Squadron at the end of 1942. He was awarded a multitude of medals including the DSC and DFC with eight clusters. He was VP for ITT before his retirement]

MEETING THE BEAST

With my parachute on my back it took three people to help me up to the Typhoon's cockpit, which is nine feet off the ground. As the plane is very streamlined there is nothing to hang to. You have to get your fingers into the hollows which are covered by metal plates on spring hinges. They close up again when you remove you hand or your foot, just like a rat trap. In the end they hoisted me up, settled me in, slapped me on the back, shouted 'good luck' and I found myself all alone inside the bowels of the monster.

I rapidly called back to mind all the gen. my instructors had given me. As the exhaust gases had a high carbon monoxide content and seeped into the cockpit you had to breathe oxygen all the time. I therefore hurriedly put on my mask and opened the intake valve. On take-off Typhoons swing hard right and I therefore adjusted the rudder trim very carefully. I opened the radiator wide. I checked the locking of the undercart - the lever looked uncomfortably like the one for the flaps. I lowered the flaps control to open up the pneumatic circuit in order to avoid ram effect just as I started up.

MURPHY'S LAWS OF COMBAT - No14.
Don't look conspicuous - it draws fire.
(For this reason aircraft carriers have been called "bomb magnets".)

I switched on the instrument panel light. I regulated the throttle lever - open five-eighths of an inch (not one fraction more, otherwise the carburettor would flood and there might be a blow back). I pushed the pitch-control lever right forward and then back an inch or so, to avoid run-away in the constant speed unit.

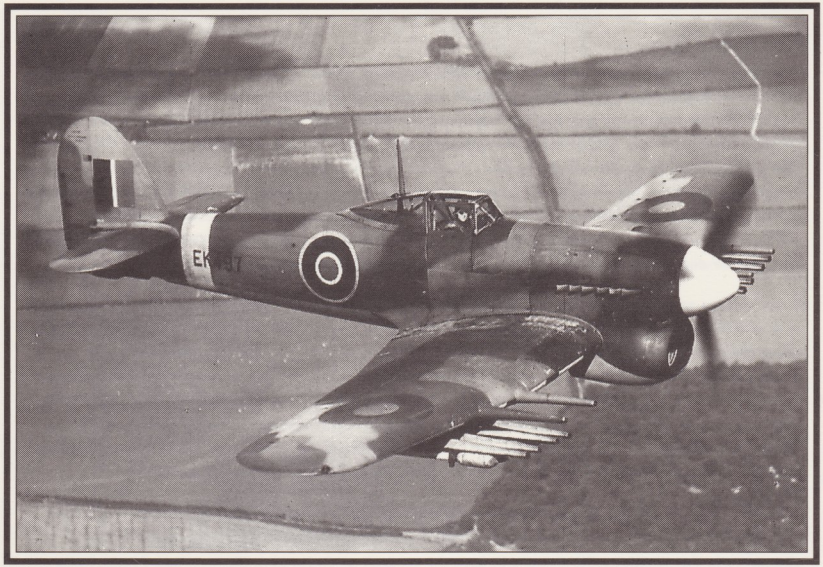
I verified that my tanks were full and selected the centre fuselage tanks for the take-off (gravity feed in case the pump packed up). I unscrewed the Wobble pumps; one sent a mixture of alcohol and ether into the carburettor, the other a mixture of petrol and oil to the cylinders.

I inserted a cartridge into the starter. (The Koffman system, which uses the violent expansion of explosive gases to get the engine turning. If the engine doesn't start first time it will almost certainly catch fire, being bung-full of juice). With one finger on the coil booster and another on the starter button, I fired the cartridge. The mechanic hanging on to the wing, helped to 'catch' the engine and it started up with a deafening roar. The amount of noise is about five times as great as in a Spitfire. After missing a few times, the engine settled down to a reasonable steady rhythm, though not without exuding oil at every pore. The sound of the engine and the way it vibrated struck me as suspicious. My nerves were very much on edge and I didn't feel at all easy in my mind. What on earth had ever induced me to return to ops?

These reflections probably lasted some little time because, when I looked up, there were the mechanics looking lightly surprised and

The best approach to a battle...is surprise, make your attack and disappear and start a new attack. Don't get engaged and make it a dogfight.

Lt. General Adolph Galland, Luftwaffe



Typhoon (RP)

Great pilots are made not born....A man may possess good eyesight, sensitive hands, and perfect co-ordination, but the end product is only fashioned by steady coaching, much practice and experience.

Air Vice-Marshal J.E. "Johnnie" Johnson, Leading RAF Ace in Europe, WWII, 38 Victories

MAN ON THE SPOT

Harris was determined that the area-bombing of German cities should be interrupted (he also claimed that the average bombing accuracy of his command would not permit the density of strikes needed to destroy rail centres). For his part, Spaatz submitted as a strategic alternative the destruction of the Reich's synthetic oil plants. Most importantly, neither leader was prepared to be placed under Leigh-Mallory's command. On the 25th March [1944] Portal convened a large meeting to settle the matter, with Eisenhower and Tedder present. In summing up, Portal, with Eisenhower concurring, gave his views that there was no suitable alternative to the 'railway plan'. Attacks on rail centres, therefore, had to be given first priority. This decision was immediately endorsed by the Combined Chiefs of Staff. Control of all the air forces passed to Eisenhower with Tedder as his executive air-deputy. Spaatz accepted the decision more gracefully than did Harris.

A week later a new obstacle emerged. Churchill was totally opposed to the interruption of Harris's programme of area-bombing attacks, and began a series of meetings of the Cabinet's Defence Committee (they started at about 10pm and ended in the early hours of the next morning), focusing his attack on the railway plan mainly on the possible numbers of French who would be killed when their railway centres were bombed. I accompanied Portal and Tedder to three of the five meetings. On 7th May, after the fifth, Churchill sent a message to Roosevelt to express his continued opposition and to ask him to intervene. Instead, the President replied saying that he was unprepared 'to impose any restriction' on what had been agreed by the military commanders on whom responsibility for the success of the invasion rested. This time Churchill backed down.

Tedder had made it plain to me that had the decision gone the other way he would have had to resign. Not until I read Eisenhower's personal papers years later did I discover that he also saw resignation as the alternative to the rejection of his demand to have the strategic air forces obey his command. Maybe Roosevelt knew. I cannot imagine what would have happened had it become necessary to change the top levels of command for an invasion that was planned to take place little more than two months later."

LORD 'SOLLY' ZUCKERMAN [Scientific Advisor to Combined Operations HQ, Allied Expeditionary Force and then Supreme HQ, AEF. He became President of the British Industrial Biological Research Association in 1974]

waiting for a sign from me to remove the chocks. I began to taxi - a bit too fast. I must be careful not to over-work the brakes. They overheated very quickly and hot brakes don't function.

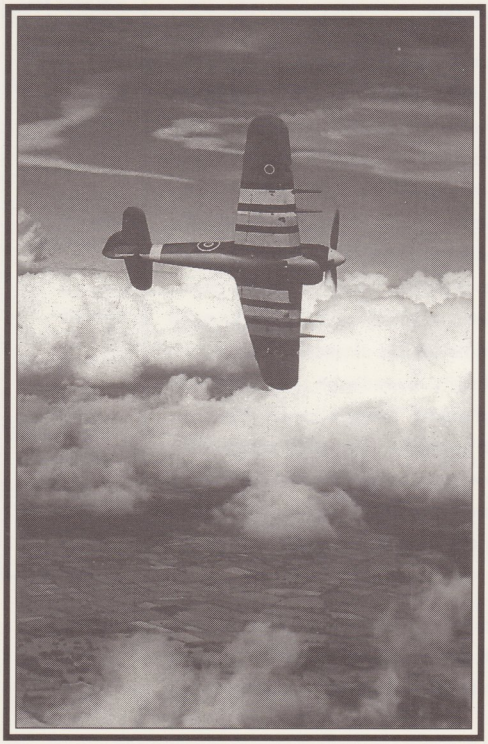
That engine! You moved forward quite blindly, picking out the way like a crab, with a bit of rudder now left, now right, so as to be able to see in front. Once I was on the edge of the runway, before venturing further I cleared the plugs, as per instructions, by opening up to 3000 revs, and a film of oil immediately spread over my windshield. Two Typhoons who were in the circuit landed clumsily, but the controller seemed disinclined to give me the green light. I stuck my head out to make a sign, even though I would probably get a dollop of boiling hot oil in the eye. Still a red light. Christ, I must have forgotten something - and my confounded engine was beginning to heat. My radiator had already got to 95°. A glance round-my flaps were at 15° all right, my radiator was open...Hell, the radio! I quickly switched it on and called: "Hallo, Skydoor, Skydoor, Tiffie 28 calling. May I scramble?" The controller replied by at last giving me a green light. Here goes! I tightened my straps, released the brakes, carefully aligned myself on the white line down the middle of the concrete and slowly opened the throttle, with my left foot hard on the rudder bar.

I had been warned that the Typhoon swung, but surely not as much as this! And the brute gathered speed like a rocket! I corrected as much as I could with the brakes, but even then I found myself drifting dangerously on the right.

I opened fire only when the whole windshield was black with the enemy...at minimum range...it doesn't matter what your angle is to him or whether you are in a turn or any other manoeuvre.

Colonel Erich "Bubi" Hartmann, GAF, World's Leading Ace, Luftwaffe, WWII, 352 Victories

Typhoon IB



Half-way down the runway my right wheel was practically on the grass. If I came off the runway I would gracefully flip on my back!
To hell with it! I tore her off the ground.

This plane just had no lateral stability at all. I still went on drifting to starboard and, with those miserable ailerons that only a 'bit' at speeds higher than 100mph, I daren't lower my port wing too much.

Luckily they had hauled F hanger down, after a series of accidents all due to the same cause, but even then I passed uncomfortably close to E hanger.

I retracted my undercart but forgot to put the brakes on. A terrific vibration which shook the whole plane from stem to stern reminded me that my wheels had gone into

the cavities in the wings still revolving at full speed. I only hoped the tyres hadn't been ruined.

Really, it had been very pleasant behind that office desk...

PIERRE CLOSTERMAN DSO, DFC.

In nearly all cases where machines have been downed, it was during a fight which had been very short, and the successful burst of fire had occurred within the space of a minute after the beginning of actual hostilities.

Lt. Colonel W.A. "Billy" Bishop, Probably the Leading WWI RAF Ace, 72 Victories

MESSERSCHMITT BF 109G

The Gustav, although built to increase the ascendency over the Spitfire Mk.V was considered by many to be inferior to the Bf 109F. Early production 'G's were distinguished from the 'F' model by the installation of a 1,475hp Daimler Benz DB 605A engine. Armament consisted of one 20mm cannon and two 7.9mm guns. The 109G also featured some structural strengthening and the provision for a pressurised cabin. Later production models featured a boost control to boost engine power above the engine's rated altitude. Other versions included a tropical, large ventral intake version, a fighter bomber version, the G-5 which featured a more powerful engine (plus two 13mm guns instead of the 7.9mm guns). The G-6 was the most important model featuring the addition of two underwing 20mm cannons and the replacement of the nose-mounted 20mm cannon with a 30mm version. There were plenty of other versions of the 'G'. Space restricts a fuller account here, unfortunately.

The Bf 109G was a widely used and much travelled aircraft flying for many airforces around the world such as Bulgaria, Croatia, Czechoslavakia, Finland, Hungary, Rumania, Spain and Switzerland.

One of the many tragic events of the war took place at the very end of the war, involving the Bf 109G when, following suggestions by Obst. Hajo Herrmann, a special fighter Geschwade of four Gruppen was formed designated Rammkommando Elbe. Most of the pilots were students, children by any other name, with perhaps one or two solo flights to their credit, volunteers whose enthusiasm was bolstered by patriotic speeches and martial music. Only one mission was undertaken by the unit on 7th April 1945 when 120 aircraft took off to intercept a USAAF bombers formation. Only 15 returned.

Me 109

MURPHY'S LAWS OF COMBAT - No18.
When you have secured an area, don't forget to tell the enemy.

Superior technical achievements--used correctly both strategically and tactically--can beat any quantity numerically many times stronger yet technically inferior.

Lt. General Adolph Galland, Luftwaffe

JUNKERS JU88

Designed by W.H. Evers and the American Al Gassner (who worked in Europe during 1935-36) and first flying on December 21, 1936, the Ju88 became the German's most successful 'all-purpose' aircraft of the war. Flying and fighting on all fronts to which the German forces were commited to during WW2, the Ju88 was to appear as a day-fighter, night fighter, dive bomber, level bomber, torpedo bomber, mine-layer, reconnaissance aircraft, communications aircraft, close support aircraft and flying bomb. The Ju88 was to be the most modified the world had ever seen and prove itself to be the best by far of the indifferent selection of bombers that the Luftwaffe flew.

FOCKE-WULF FW 190A

The brainchild of Dipl. Ing. Kurt Tank, technical director of Focke-Wulf Flugzeugbau, the Fw 190 was a spectacular success combining a bulky air-cooled engine with a slim airframe. Beautifully proportioned, the Fw 190 spread consternation and alarm throughout the Allied forces - especially Spitfire V pilots who found that they were, suddenly, heavily out-classed. This gave rise to the Mk. IX.

The first major action in which the Fw 190A participated was the 'Channel Dash'. On the night of the 11th/12th February 1942 the German capital ships Scharnhorst and Gneisenau left Brest with escort-

ing vessels and began a hazardous voyage through the Channel on their way to safer anchorages in Kiel and Wilhelmshaven. Galland, newly promoted to Inspector of fighters on the death of Werner Molders, had the task of providing fighter cover throughout the voyage. The Fw 190s aquitted themselves well in almost continual combat of February 12th and Operation Thunderbolt (the official German code-name).

Fearful for their depleted fighter units in Northern France, the Luftwaffe High Command ordered the dispersal of the Gruppen of JG 26 away from the intensive Allied bombing of the invasion coasts in May/June of 1944. Thus it was that on the morning of June 6th the only fighter forces to launch an attack on the Normandy beaches were two Fw 190As! They were the machines of Oberst Josef 'Pips' Priller, the flamboyant Geschwaderkommodore of Wodarczky. I/JG 26 had flown to Rhiems, II/JG 26 to Mont de Marsan in Gascony, and III/JG 26 to Metz. The two pilots' strafing run was the only Luftwaffe activity over the beachhead during the daylight hours of D-Day.

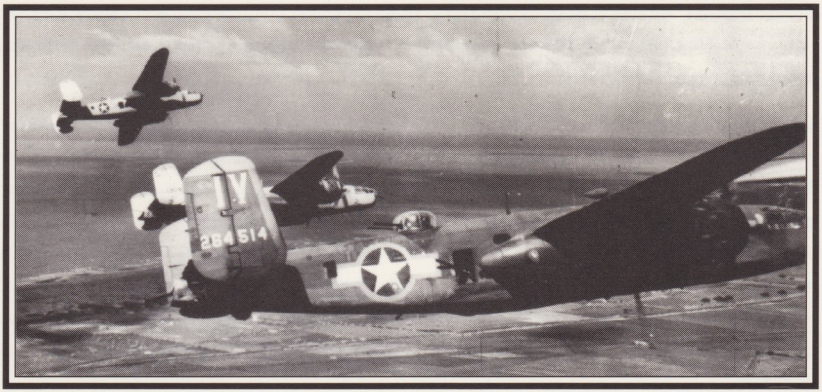
[The Luftwaffe High Command] were stuck on the idea that manoeuvrability in banking was primarily the determining factor in air combat....They could not or simply would not see that for modern fighter aircraft the tight turn as a form of aerial combat represented the exception.

Lt. General Adolph Galland, Luftwaffe

B-25 MITCHELL

The North American was the most widely used American bomber in WW2. A steady increase in firepower, adaptability to combat and good flying qualities made this twin-engined medium bomber the most popular plane in its class.

It was the RAF who used the Mitchell over German-occupied Europe. The RAF had received 23 B25-Bs, named the Mitchell I and the B-25D, named the Mitchell II.



B-25 Mitchell

FIGHTER COMPARISONS

What follows are selected comparisons between many of the combatants and allied aircraft to give the reader a general idea as to how technically balanced the air war over the D-Day skies actually was. Of course, technical comparisons say nothing for pilot skill. However, pilots can only use what tools they are given. This section is a digest of those tools.

MUSTANG P-51B v SPITFIRE IX

The comparison between these two aircraft is an intriguing one because they both had similar engines: similar in both design and in their capacity. The Mustang was rather cleaner than the Spitfire but a little heavier. It also had a higher wing loading of around 12-13 pounds per square foot.

When looking at the endurance of both aircraft it can be seen that the Mustang had a greater range with a maximum fuel load of around 1.5 to 1.75. The Mustang was able to carry more fuel and oil. With long-range fuel tanks the Mustang could carry 279 gallons of fuel as opposed to the Spitfire's 177 gallons (all measurements are 'imperial'). Fuel consumption was similar but speed was greater for the P-51B, in level flight, by around 20mph. Even with the same engine settings the Mustang was 20-30mph faster than the Spitfire IX for all heights. With the engine settings set to maximum (say, around 3,000 rpm) the best performance heights are similar between 10,000 and 15,000ft and between 25,000 and 32,000ft.

Where the Spitfire excelled was in the rate of climb which was superior at all heights to the P-51B at full power. At other settings the rate is more even. The Mustang had a better zoom climb, however. It also required less power to regain altitude and speed from a dive.

During a dive the Mustang pulled away very quickly. At the same revs the Spitfire needed more engine boost to remain in formation. Another plus point for the Spitfire was the turning capability of the aircraft. It always out-turned the P-51B, even when the Mustang used flaps. Nor could the Mustang roll as quickly as the Spitfire IX at normal speeds. However, the rate of roll was similar at around the 400mph mark. Finally, the four .5 Brownings of the Mustang were rather small in comparison with the Spitfire IX's two 20mm cannon and four Browning .303 guns.

MUSTANG P-51B v FOCKE-WULF FW 190A

The P-51B was almost 50mph faster at all heights than the Focke-Wulf. This figure increased to around 70mph above 28,000ft. However the maximum rate of climb was similar and the Mustang was a lot faster in the zoom climb at all heights. Similarly the P-51B could out-dive a Fw 190A.

When it comes to the turning fight the two aircraft are similar. If anything the Mustang was slightly superior. Where the Fw 190 was in a class of its own was in the rate of roll which was exemplary in the Focke-Wulf.

Mustang pilots were always advised to retain high speeds in order to gain the height advantage when attacking Fw 190s, although climbs at less than 250mph were frowned upon. As the Focke-Wulf could not dive out of trouble the Mustang pilot was always recommended to turn steeply and engage full throttle when defending against the Fw 190.

MUSTANG P-51B v MESSERSHMIDT ME 109G

The Me 109 was slower than the P-51B at all heights. For example, at 16,000ft, the Mustang was 30mph faster and at 25,000ft the Mustang exceeded the Me 109 in speed by 50mph.

Climb, however, was similar. The Mustang was a little bit better above 25,000ft but not so good as the Me 109 below 20,000ft. The Me 109 did have a very good climb rate which meant that it was similar in this respect to the Mustang. When defending against the Me 109 the Mustang could pull away from the Me 109 in a prolonged dive.

Although the Mustang could out-turn the Me 109 the rate of roll was very similar. However, because the Me 109's wing slots kept opening at the most inopportune moments, the Mustang could defend itself against the Me 109 by quickly changing its direction. This would normally throw the sights of the Me 109 off the chased P-51B. If the P-51 was on the attack, the Mustang would always catch the Me 109 except in a climb. When defending, the P-51B pilot was advised to initiate a steep turn and a dive if necessary.

TYPHOON 1B v TEMPEST V

Only the Typhoon is simulated in this game, the Tempest V appeared on the scene after D-Day. However, as the Typhoon was the principle air-to-ground attack aircraft of the war, that is, the Typhoon was tailor-made for this purpose, it might be interesting to see what the RAF had to deal with before the improved Tempest came into the inventory.

Both aircraft were similar in many respects and differed mainly in the wing-section which was around two pounds less for the Tempest. Without extra tanks the Typhoon and Tempest had similar ranges. The Typhoon cruised at around 15-20mph less at the

TYPHOON - THE FIRST A-10

Before the war ended, Typhoons dropped napalm, carried out blind bombing under the direction of Mobile Radar Control Post and assisted the French SAS by dropping food and arms containers. Numerous enemy containers. Numerous enemy targets were attacked, right up to the German surrender. The final loss record was more than 500 aircraft since D-Day. Over 220,000 rockets were launched during the European campaign, the majority of these being fired by Typhoons.

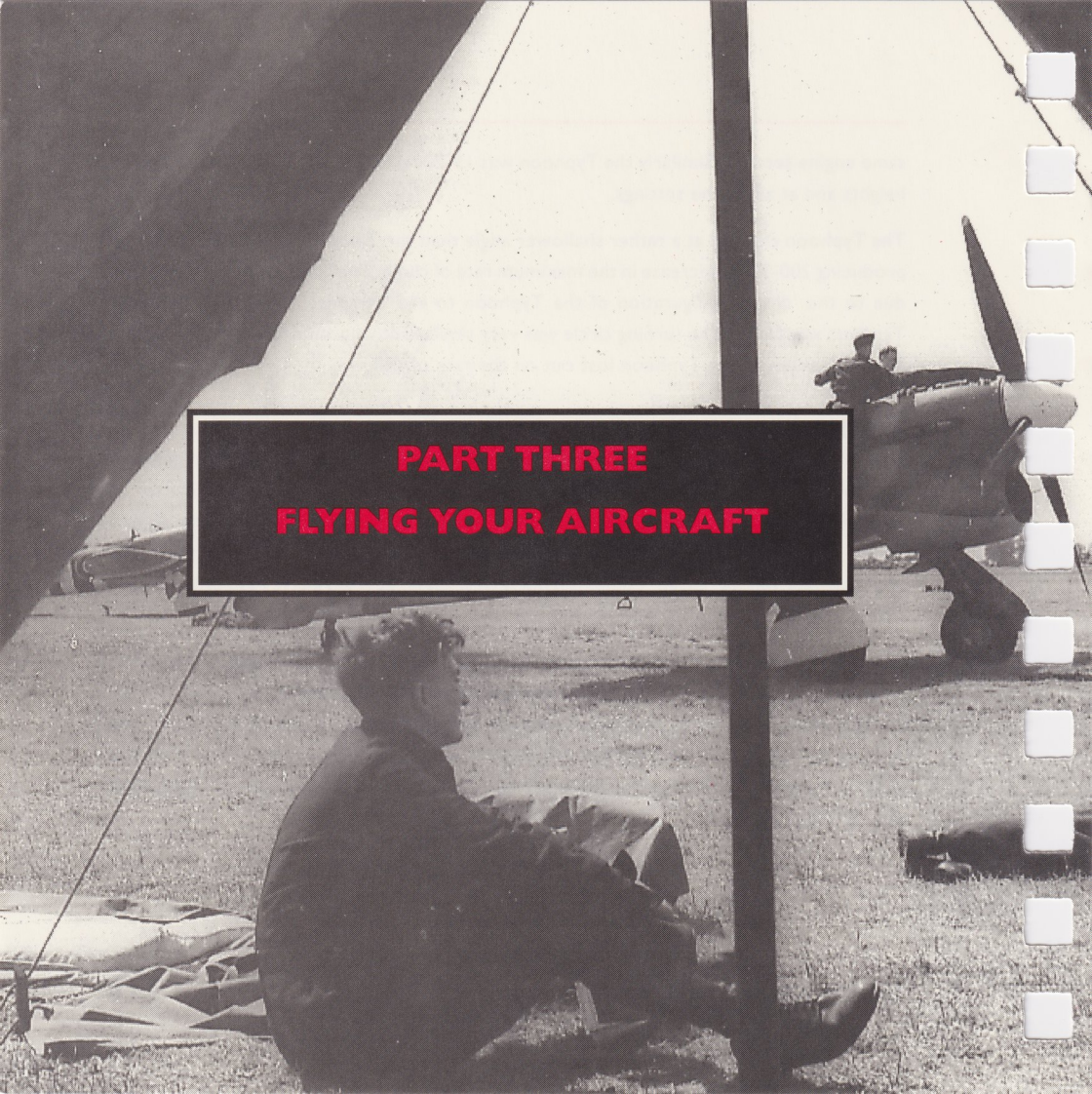
same engine settings. Similarly the Typhoon was 15-20mph slower than the Tempest at all heights and at all engine settings.

The Typhoon climbed at a rather shallower angle than the Tempest at the same airspeed producing 200-300ft decrease in the maximum rate of climb. The zoom climb was less, too, due to the 'dirty' configuration of the Typhoon to the Tempest. Again, in a dive, the Tempest was faster. The turning circle was very similar with any differences favouring the Typhoon although the Typhoon lost out on the rate of roll.

FOCKE WULF FW 190A V SPITFIRE IX

The Spitfire was slightly superior in speed to the Fw 190 at medium and high altitudes with the Fw 190 gaining the edge in low altitudes. However, the difference was a matter of around three to eight miles per hour over all heights. Again, the Spitfire IX was slightly better in climb under maximum continuous climbing conditions. Above 22,000ft the improvement was increased. Climbing from level flight or up from a dive resulted in the Fw 190 gaining the edge.

In a dive, however, the Fw 190 was faster and more manoeuvrable in all regimes other than turning circles. The rate of roll was excelled by the Fw 190. The flicking into a dive turn by Fw 190 pilots enabled it to evade the Spitfire IX on numerous occasions. If the Spitfire was cruising at high speeds then the Fw 190 could never attack it successfully. The Fw 190's superior acceleration meant that an attack on a Spitfire which was cruising at low speeds was far more successful.


PART THREE
FLYING YOUR AIRCRAFT

A good fighter pilot, like a good boxer, should have a knockout punch....You will find one attack you prefer to all others. Work on it till you can do it to perfection...then use it whenever possible.

Group Captain Reade Tilley, RAF, 7 Victories, WWII

BASIC FLIGHT SKILLS

TAKING OFF

Assuming that you want to begin the flight from the airfield, on entering the cockpit you will notice that the engine has already been started and that the RPMs quickly run up to full power.

The first job is to drop the flaps and ease the nose of your tail-sitter forward in order to allow your aircraft to gain maximum take-off speed. As the speed hits 140mph ease back on the stick. Notice the vertical speed indicator indicates that the aircraft is climbing. Once you have between 50 and 100 ft on your Altimeter raise your gear to increase your speed still further (raising the landing gear reduces drag on your aircraft) and join the outward bound squadron who will be taking off, simultaneously, with you.

If you forget to raise your landing gear, or inadvertently lower it during high-speed flight you risk jamming the gear in the lowered position. At the very least, your aircraft will begin to yaw to the right making control difficult and, eventually, leading into a difficult to control roll.

CLIMBING

To climb you must increase your throttle and pull back on the stick. The extra engine power will result in a climb. The greater the angle of attack the greater the rate of climb. However, do not increase the angle of attack too far otherwise the aircraft will stall. Around 20° of climb is a

recommended angle of attack.

REDUCING ALTITUDE

There are two ways to reduce altitude. The first, is to decrease the throttle. This will result in your aircraft losing speed which will mean that the aircraft cannot generate enough lift and, hence, loses altitude. The second method is to push the joystick forward to dive which will increase your speed and lose altitude very quickly.

TURNING YOU AIRCRAFT

To turn your aircraft you move the joystick left or right, depending on which direction you wish to turn. Using this method for more acute turns will also reduce your speed gradually resulting in some loss of altitude. To maintain your altitude you should pull on the joystick as you turn left/right and apply a little rudder in the same direction as the turn.

The most important thing in fighting was shooting, next the various tactics in coming into a fight and last of all flying ability itself.

Lt. Colonel W.A. "Billy" Bishop, Probably the Leading WWI RAF Ace, 72 Victories

STALLING

If you ever stall your aircraft just let the nose fall below the horizon, it will then gain enough speed to return control to your joystick.

LANDING YOUR AIRCRAFT

After you have lined up with the runway, position yourself about two to three miles from it, reduce the throttle to 60%, then drop your flaps. This action lowers your stall speed enabling you to approach the airfield at a slower speed and a steeper angle. Gradually descend towards the

runway itself. When you cross the threshold of the runway you should be around 40 feet from the ground. Reduce your height to around 20ft, then cut the throttle and pull the nose up. The aircraft will then settle on the airfield. Try to position this landing so that all three wheels hit the floor at the same time. This is the classic three-point landing.

When reaching a stalemate, win with a technique the enemy does not expect.

Miyamoto Musashi

COMBAT BOOST

The Combat Boost is a valuable feature that boosts the performance of your engine for a brief period. However, as this increase in performance extends beyond the rated power of your engine it does put a considerable strain upon it. Hence, you should only use the Combat Boost very sparingly. As a guide: the first 30 seconds of use should offer no damage to the engine; every 10 seconds after that reduces your engine power by 1/16th. At zero power your engine blows up.

Everything that is in the air that is beneath me, especially if it is a one-seater...is lost, for it cannot shoot to the rear.

Baron Manfred von Richthofen, Leading Ace of WWI, German Air Service, 80 Victories

AIR BRAKES

Air brakes are very handy for gaining an advantage during combat as they drastically reduce your speed and force pursuing enemy aircraft to overshoot, for example. The problem is that WW2 aircraft, in general, didn't use air brakes. So, therefore, using this feature in the game will not give you historical flight conditions. We recommend air brakes for those of you who have become used to using them in other simulations and wish to become familiar with flight combat in Overlord before 'weaning' yourself off them for more realistic flight.

GUNNERY TACTICS

DEFLECTION SHOOTING

If you are thoroughly conversant with [tactics], you will recognise the enemy's intentions and thus have many opportunities to win.

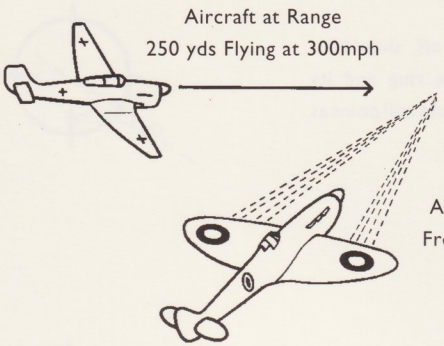
Miyamoto Musashi

Deflection shooting is required when you are attempting to hit an enemy aircraft at an angle. That is, when the enemy aircraft is not moving directly towards or away from you. Deflection shooting is all about prediction. In effect you are shooting at where you 'predict' the enemy will be. The reason is elementary, by the time your bullets arrive at the point where the enemy is, at the time of the trigger pull, the aircraft will have moved onwards. Deflection shooting is essential in air combat, therefore. The bullets and shells leave the aircraft at over twice the speed of sound. An enemy fighter, at a range of 250 yards, flying at 300mph, travels a distance of 70 yards in the time it takes for the bullets/shells to reach it. In a beam attack (from the side), the pilot must aim at 70 yards in front of the targets to get a hit.

Surely if there is one military maxim of universal value, it is to press hard on a rout.

Colonel T.E. Lawrence, 1935

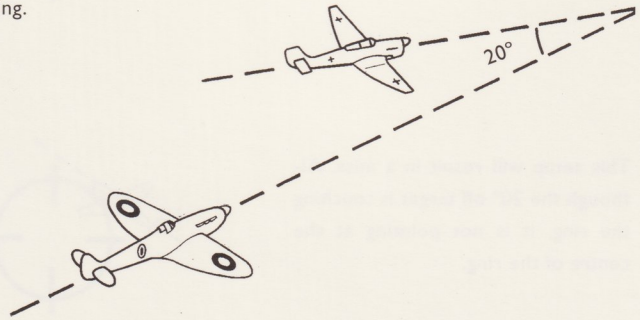
Normally the angle between the two aircraft is much less than the 90° of a beam attack. As the angle is reduced then the 'lead' required is reduced from the 70 yards mentioned above. In the stern attack (directly behind) no 'lead' is required at all. A stern attack is only usually likely when the target is taken completely by surprise. Normally you will be faced by a deflection shot. Becoming an expert on deflection shooting is essential if you want to become an Ace. The gunsight can be used when setting up a deflection shot.



I never went into the air thinking I would lose.

Commander Randy "Duke" Cunningham, USN, 5 Victories, Vietnam Conflict

First of all it is necessary to estimate the angle between your aircraft and the target. For instance a target is 20° off, if lines extending along the length of yours and his aircraft meet an an angle of 20°. For a target which is 20° off, the target should touch the ring and point at the centre of the ring.



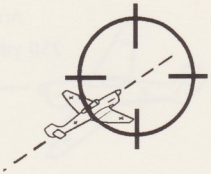
Once at the enemy, you should not aspire just to strike him, but to cling after the attack.

Miyamoto Musashi

To get ability you need good training.

Colonel Erich "Bubi" Hartmann, GAF

Targets that are 10° off, should be half way between the ring and its centre. The target should still point at the centre of the ring.

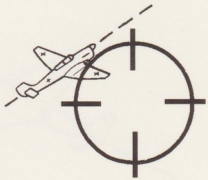


Here is an example of a 5° off setting

Don't let the enemy trick you into pulling up or turning until you lose your speed.

Major Thomas B. "Tommy" McGuire, USAAF

This setup will result in a miss. Although the 20° off target is touching the ring, it is not pointing at the centre of the ring.



GROUND TARGETS

Ground targets consist of Buildings and Bunkers of various types, E-Boats, V1 Sites, Trucks and the like, Trains and Marshalling Yards, Triple-A guns large and small calibre, Radar stations, etc. There are also other objects scattered around such as Chateaus and so on.

To attack a ground target, especially as we are talking about the WW2 period, is a rather hit and miss affair. Precision bombing/strafing, especially for fighter-type aircraft was fairy-tale stuff. Hence, you will become more adept at the techniques with more practice and adjustment.

However, as a guide, if you are bombing or attacking a target with rockets you should begin an attack in a shallow dive, pointing your aircraft at the target a fair distance away in order to allow you to make minor course adjustments. For a rocket attack, you will need to get close in for a kill with both bombs and rockets. When you have released your load quickly pull up and get the hell out. There are two reasons for this, firstly, as you are concentrating on your target, enemy aircraft will be concentrating upon you. As you're unaware of what's going on around you as you line up for a target it's best to make sure of your safety by pulling up, jinking and weaving. In addition, this evasive manoeuvring is handy for avoiding the small arms ground fire that will home in on you as you reduce your altitude. Finally, do not get too close to the target upon weapon release as you are liable to shoot yourself down from the

The winner (of an air battle) may have been determined by the amount of time, energy, thought and training an individual has previously accomplished in an effort to increase his ability as a fighter pilot.

Commander Randy "Duke" Cunningham, USN, 5 Victories, Vietnam Conflict

The lead Messerschmitt suddenly stopped smoking. It was a complete give-away; I knew that at this instant, he'd cut power. I chopped the throttle to prevent overrunning the enemy fighter. I skidded up to my right, half rolled to my left, wings vertical. He turned sharply to the left; perfect! Now--stick hard back, rudder pedals co-ordinating smoothly. The Thunderbolt whirled around, slicing inside the Messerschmitt. I saw the pilot look up behind him, gasping, as the Thunderbolt loomed inside of his turn, both wings flaming with all eight guns. This boy had never seen a Thunderbolt really roll; he was convinced I'd turned inside him.

Major Robert S. Johnson, USAAF

blast of the explosion.

For ground strafing it is best to 'walk' the bullets to the ground target. That is, start firing your guns, see where they are hitting and adjust your line of flight so that the line of bullets will coincide with your target as you progress.

One hint for Triple-A attacks is wait for the guns to fire then hit them as the guns have to be reloaded after a burst of fire.

For trains, it is best to cripple the engine to stop the train and then pick off the carriages at your leisure.

When attacking E-boats you should be aware that, although the individual armament of a single E-boat is no great threat, the combined efforts of a bunch of E-boats IS. Beware of cross-fire.

AIR TARGETS

Dealing with enemy fighters is discussed in detail, elsewhere. However, if you want to hit a bomber then there are alternative attacks that should prove effective.

The Ju88 has two rearward facing machine guns and a nose mounted gun, thus there is no rearward blind-spot. However, the front gun is very restricted in its manoeuvrability so a frontal assault can be more productive. Nevertheless, you will also have to contend with the higher degree of manoeuvrability the Ju88 can employ. Of course, the Ju88 will normally be escorted by fighters which makes the job that much harder. As for the He111 you could try the stern approach. However, you must be careful of rearward firing guns. This approach requires a high degree of flight skill. High and low attacks from the rear of the He111 could be more fruitful. Approach the bomber at a 45° angle and utilise deflection shooting to gain a hit. As you pass the bomber, turn when you are alongside the bomber and turn into 45° to try another pass. Another successful attack position is to dive onto the side of the bomber from height, using the speed gained from the dive to zoom past and climb again over the opposite side. The head-on pass is similar to the stern attack as it requires high skill to avoid the nose gunner. It can be a lethal attack, though, if it hits the cockpit and engines in the right place. Probably the most fruitful approach is the lower-rear attack. The lower gunner has a greater difficulty in achieving a good sighting.

He who gets excited in fighting is sure to make mistakes.

Baron Manfred von Richthofen

Fighting spirit one must have. Even if a man lacks some of the other qualifications, he can often make up for it in fighting spirit.

Brigadier General Robin Olds, USAF

THE SIX O'CLOCK NEWS

FIGHTER COMBAT GUIDELINES

Dogfighting provided the staple diet of all fighter pilots during WW2. Getting on the tail, or the 'six' of the enemy was all important to achieve a kill. Here's a few manoeuvres and procedures on how you can best get to grips with the enemy psyche in Overlord.

Having a highly specified aircraft is all very well. However, the principle variable in determining just whose butt gets shot off is the pilot himself and his intimate knowledge of all aspects of relative performance and design, as well as familiarity with his weapons.

Basically, if you know your own aircraft and your enemy's aircraft like the back of your hand then you have an enormous advantage over the enemy. Despite the popular misconception, air-to-air combat is a very 'human' affair. Pilots aren't kidding when they say that they strap on an aircraft. Never forget that technology is but a tool of the pilot.

The aim of the game is all about one pilot exploiting the opponent's most serious weaknesses while taking full advantage of his own fighter's greatest strengths. For example, what do you do if your aircraft is highly manoeuvrable (eg: Fw 190) but your opponent is more powerful and, hence, faster (eg: Typhoon)? You employ a system known, in some quarters, as Angles Tactics. The manoeuvrable aircraft can get up close

Everything I had ever learned about air fighting taught me that the man who is aggressive, who pushes a fight, is the pilot who is successful in combat and who has the best opportunity for surviving battle and coming home.

Major Robert S. Johnson, USAAF

to the faster aircraft by using Pure and Lead Pursuits (Figure 1 on page 131) . High and Low Yo-Yos (Figures 2a & 2b on pages 132 & 133) and Barrel-Roll attacks (Figure 3 on page 134) also may be useful. On the other hand, if you are flying the faster, more powerful aircraft, your best option is to keep the fight to the horizontal plane.

Nose-To-Nose Turns (Figure 4 on page 135) make best use of turn radius potential and Lead Turns (Figure 5 on page 136) can be very useful for immediate turn superiority. Hence, the pilot of the faster, less manoeuvrable aircraft will want to watch and keep clear of these manoeuvres. He'll also want to try to anticipate his opponent attempting to trap him into these manoeuvres. If this happens then it's time to break off and start again.

The Typhoon would suffer by a Flat Scissors (Figure 6 on page 137) since it has both turn performance and minimum speed disadvantages. The Fw 190 might also have some advantage in a Rolling Scissors (Figure 7 on page 138) because of better slow-speed controllability - although not as great as the Flat Scissors.

It is plain that the Typhoon should keep to what he knows best, high energy tactics when engaging a highly manoeuvrable aircraft like a Fw 190.

A handy manoeuvre for the Typhoon which is on the defence is the Defensive Spiral (Figure 8 on page 139). A Typhoon often can generate much greater drag than a Fw 190 which can lead to a rapid vertical

There is nothing, absolutely nothing, to describe what goes on inside a pilot's gut when he sees a SAM get airborne.

Commander Randy "Duke" Cunningham, USN

No guts, no glory. If you are going to shoot him down, you have to get in there and mix it up with him

Major Frederick C. "Boots" Blesse, USAF, 10 Victories, Korean Conflict

overshoot and a subsequent positional advantage for the Typhoon which can then blow the Fw 190 out of the sky with its guns. However, if this spiral cannot be initiated quickly then the Fw 190 can use its superior low-speed turn performance to shallow out the spiral and regain the upper hand as the manoeuvre continues.

Throughout the fight, the pilot of the Fw 190 can be somewhat less concerned with overshoots than he would be in the case of similar fighters, since the Typhoon's larger turn radius and higher speed make it more difficult for its pilot to gain advantage after an overshoot by the Fw 190. Gross vertical overshoots should still be avoided by the Fw 190, since they may allow the Typhoon a temporary advantage and, possibly, a snapshot after one of the Rolling Scissors. The Fw 190 should resist climbing or diving when faced with a Typhoon to guard against zoom manoeuvres from the Typhoon. Greed is the Fw 190's greatest enemy. He should avoid trying to grab angles faster than the Fw 190's performance permits. Patience is the key. The Fw 190 pilot must wait for the Typhoon to wear himself out, to dissipate the majority of his energy so that his flight becomes sluggish. Now, with the Fw 190's greater degree of manoeuvrability at low speeds, he can finish off the Typhoon at his leisure.

Again, though, the Typhoon, must be aware that this is just what the Fw 190 is wishing and wanting. Hence, the Typhoon pilot must maintain a relatively high speed. Even if the situation becomes to look favourable, if the Fw 190 is not within the gun-sight then it is safer to get out of there,

gain more speed and live to fight another day.

When two aircraft are more evenly matched then a pilot's cunning becomes more important and the dissimilar aspects of the aircraft's performance might be rather closer to the 10% figure. Stepping back in time the two famous adversaries that epitomised dogfighting were the Sopwith Camel and the Fokker Triplane. As both aircraft are highly manoeuvrable, pilots had to develop new tactics. For example, when flying at slow airspeeds the pilot may choose to push over the top of a vertical climb or to employ a 'rudder reversal' at the peak of his zoom. Also called the 'hammerhead turn', the latter manoeuvre causes the aircraft to rotate about its vertical axis, pivoting sideways from a nose-high to nose-low attitude. In most aircraft the rudder reversal is performed in an unloaded condition by applying full rudder in the direction the pilot wishes the nose to fall. If you ever get to an airshow, watch the aerobatic Pitts Specials or the Sukhois perform this manoeuvre. They tend to spill smoke whilst doing so to emphasise the action. The lazy tipping of the aircraft looks like the aircraft is balanced on its tail and is slowly tipping over to the side.

Of course, with the increasing number of aeroplanes one gets increased opportunities for shooting down one's enemies, but at the same time, the opportunity increases of being shot down one's-self.

Baron Manfred von Richthofen

This technique apparently was first used in combat by Max Immelmann, the famous WW1 German flyer who was also one of the world's first fighter aces. One of Immelmann's favourite tactics was to make a high-speed diving attack on his victim, then pull up vertically, perform a rudder reversal and dive back down for another attack and so on, until the target was destroyed. This tactic so confounded the Allied oppo-

An aggressive act in the initial phases of the attack will very often give you a breather and a head start for home....Showing a willingness to fight often discourages the enemy even when he outnumbers us, while on the other hand I have, by immediately breaking for the deck on other occasions, given the enemy a "shot in the arm," turning his half-hearted attack into an aggressive one.

Lt. Colonel John C. Meyer, USAAF

nents that they dubbed it the Immelmann Turn (Figure 9 on page 140) and were convinced that it defied the laws of aerodynamics. Once it was figured out, the technique was widely copied by both sides. American ace, Air Vice Marshal, Jonnie Johnson explains, however, how when more powerful aircraft like the Camel came onto stream, that the manoeuvre could be a dangerous one if it wasn't timed properly,

"...for the lower pilot could climb after the Fokker Triplane and attack when it hung almost motionless in the vertical position, not under full control and presenting an easy shot."

Of course, all of the above look nice in a manual. However, in practice you have the practical problems of keeping your eye on your opponent. Looking over your shoulder at a bogey and trying to keep a visual during high-g manoeuvres, is tough. Although, in Overlord, this situation is eased somewhat with the use of the Inside Lock. Keeping visual under these conditions makes aircraft control and energy management difficult to maintain. For example, it's difficult to know whether your wings are level. Also, speed and altitude have to be judged by feel since the pilot may not be able to afford the luxury of actually taking his eyes off the bogey to look at the gauges - arduous and hazardous when you're fighting at low level.

ILLUSTRATIONS

> *The effect of superior numbers in a decision to attack is small. The tactical advantage of position - altitude - sun - and direction of attack are the influencing factors. With these factors in my favour the number of enemy aircraft is irrelevant.*
>
> *Lt. Colonel John C. Meyer, USAAF*

THE 'LEAD' AND 'PURE PURSUIT'

The Pure Pursuit is where the chasing aircraft keeps his nose firmly on the target aircraft at all times, generating a curved flight path that ends in a tail-chase with the target intercept at about point 5.

The Lead Pursuit results from the aircraft leading the aircraft somewhat, keeping the nose of the aircraft ahead of the enemy by a small amount. This pursuit also results in a tail-chase but it takes less time to do it - between 4 and 5.

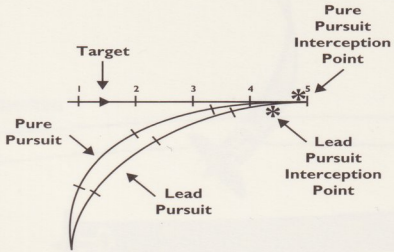


FIGURE 1

HIGH AND LOW YO-YOS

The High Yo-Yo is handy for preventing overshoots and reducing the angle-off-the-tail. Speeds of both aircraft should be about the same. One tip for the attacker is, not to raise your nose too high as this can result in you losing speed/energy and the defender getting away from you.

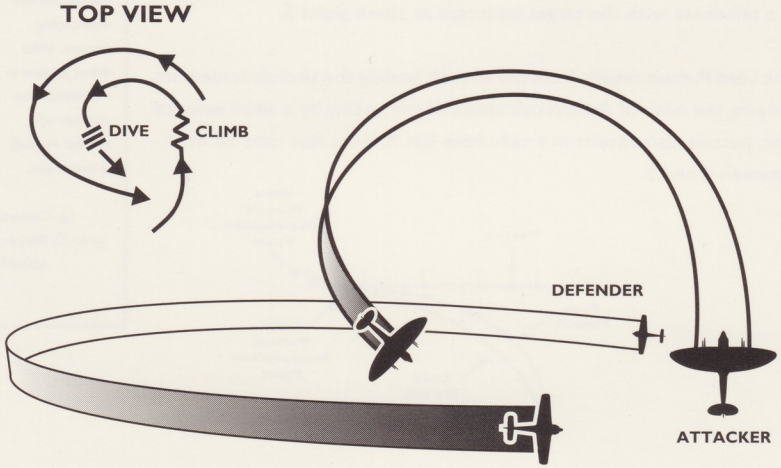


FIGURE 2a

The Low Yo-Yo should be used to get closer to the aircraft and improve your angle-off-the-tail. This is handy for less manoeuvrable aircraft who can not pull their nose around to get a shot in. This manoeuvre allows you to turn your aircraft's nose down whilst rolling your aircraft into the turn thus manoeuvring your nose well in front of, but below, your enemy's position. Gravity also helps this turning manoeuvre. Thus backing up your belief that God is on your side.

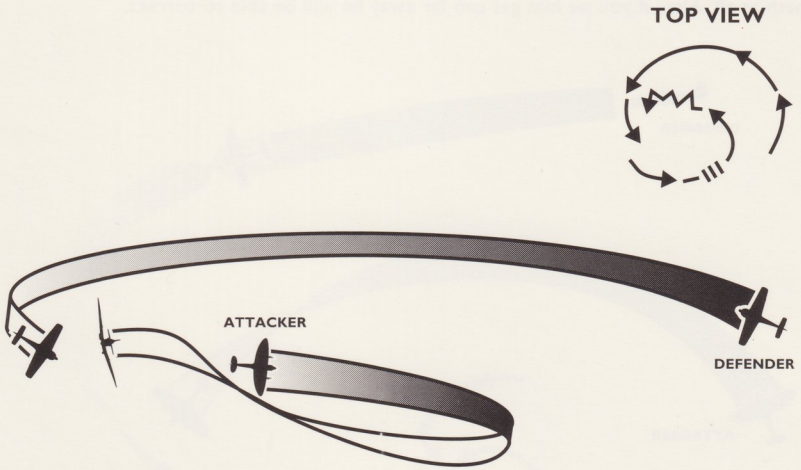


FIGURE 2b

BARREL ROLL

The Barrel Roll is a classic manoeuvre to defend against a gun attack. Completed as per the illustration the defender can cause the attacker to break off the attack or overshoot the defender's flight path. This form of nose-low, high-g manoeuvre is not recommended at low altitude, though. Don't forget to keep a look out for bogies because this manoeuvre is best adopted after the bogey is spotted at some distance from your aircraft. If you allow him to get too close before going for the Barrel Roll you will not divert the bogey from his flight path at all. Also, if you let him get too far away he will be able to correct.

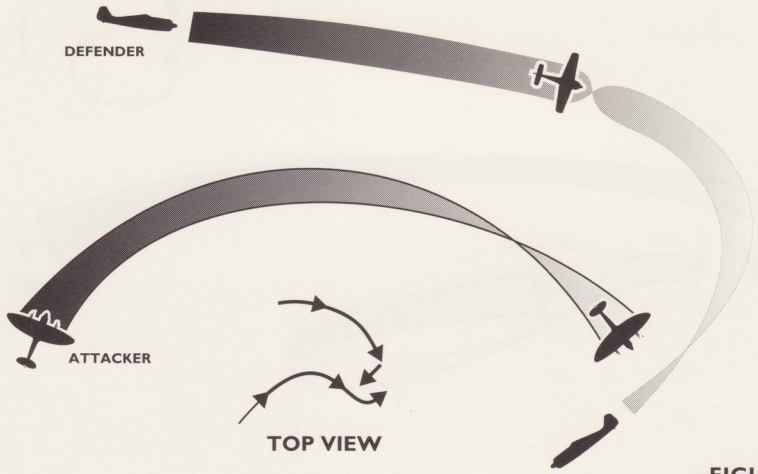


FIGURE 3

NOSE-TO-NOSE TURN

A handy turn for manoeuvrable aircraft as, when the two aircraft have passed, the manoeuvrable aircraft is able to turn quickly to achieve superiority. It's the aircraft with the tighter turn radius that wins the nose-to-nose turn battle, not the aircraft with the better turn-rate capability.

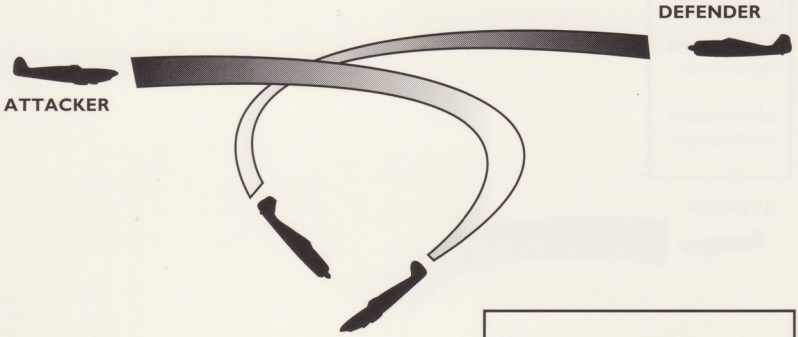


FIGURE 4

Months of preparation, one of those few opportunities, and the judgement of a split second are what makes some pilot an ace, while others think back on what they could have done.

Colonel Gregory "Pappy" Boyington, USMC, 28 Victories, WWII

The fighter pilots have to rove in the area allotted to them in any way they like, and when they spot an enemy they attack and shoot him down; anything else is rubbish.

Baron Manfred von Richthofen

LEAD TURN

A Lead Turn is where the attacker turns early before he passes his opponent. This manoeuvre is often used as a linking operation to a Lead Pursuit or a high-angle gun snapshot. This manoeuvre has to be well timed, though, to prevent you planting yourself in front of the opponent's nose and guns.

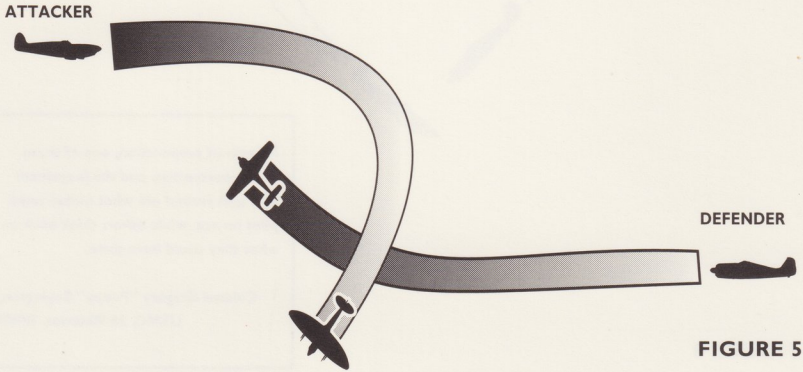


FIGURE 5

FLAT SCISSORS

This manoeuvre is, actually, a series of nose-to-nose turns and overshoots performed by two aircraft flying in the same direction and at a similar altitude. Both are trying to get behind the other. However, the aircraft with the smaller turn radius will always win this tussle as it can turn tighter into the opponent's tail.

A soldier who is familiar with his weapon can only achieve a maximum effect with it when he believes in the way it is tactically employed.

Lt. General Adolph Galland, Luftwaffe

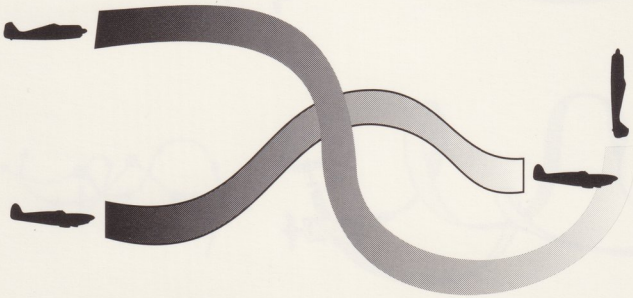


FIGURE 6

ROLLING SCISSORS

A Flat Scissors approach follows a slow-speed horizontal overshoot. However the Rolling Scissors often results from a high-speed overshoot. Here, the defender pulls up to reduce speed, the attacker follows and starts the Scissors sequence. The secret to winning this bout is more a combination of aircraft performance and pilot technique in preventing an overshoot whilst maintaining energy.

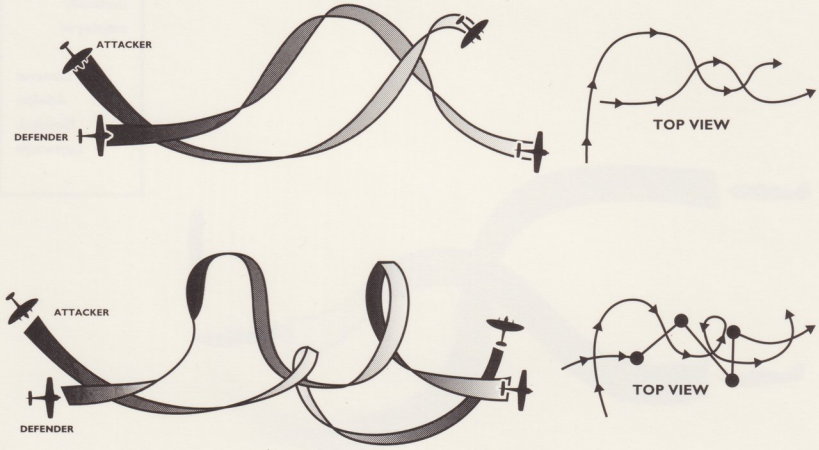


FIGURE 7

DEFENSIVE SPIRAL

Related to the Scissors, the Defensive Spiral is a form of tight Rolling Scissors going straight down. This manoeuvre benefits the faster aircraft as it results in a transferal of the faster aircraft's energy into useful energy. If recognised early the attacking aircraft can maintain a level turn, passing over the position of the target, then beginning the pull-down. Thus, the defender cannot keep the attacker in sight. This maintains a degree of separation and prevents any possibility of an overshoot.

FIGURE 8

MURPHY'S LAWS OF COMBAT - No14.
The important things are always simple.

IMMELMANN TURN

Often performed as the result of a head-on pass by two aircraft. The 'Hammerhead Turn', 'Rudder Reversal' or 'Immelman Turn' allows the aircraft with the highest energy to perform this manoeuvre and become the attacker as shown in the diagram. The attacker, by having the option of deciding which way to flick his rudder, can choose the position of attack. If performed correctly the defender is in a heap of trouble. He might try a high-g turn to gain a sight for his guns. However, this will result in dramatically slowing his aircraft and, thus, endangering it. If he decides to run for it the defender will be diving away to gain speed and distance. Breaking away from a possible attack from the attacking aircraft is guesswork at best and will either end up as a lucky shot by the defender onto the over-shooting attacker or the defender breaks off from the combat entirely. Again, defending this manoeuvre is best done before the manoeuvre is accomplished in the first place. If recognised early enough the defender can break off and gain height to maintain energy.

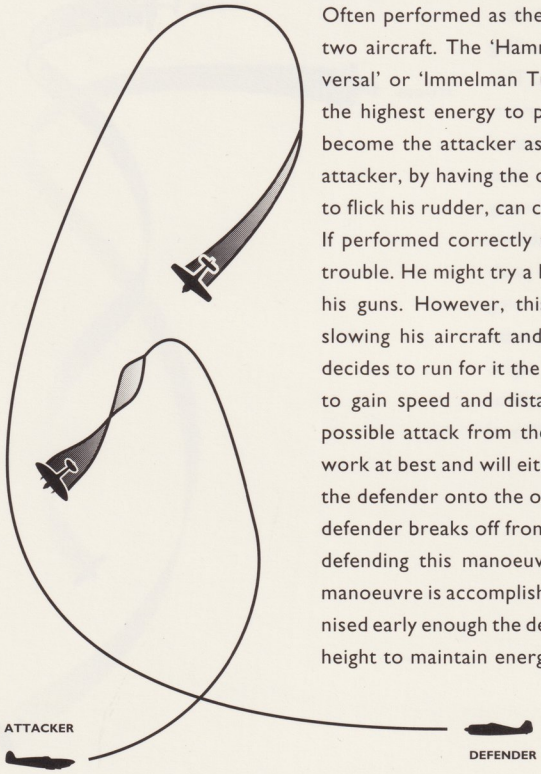


FIGURE 9

DESIGNER ADVICE

by Rod Hyde

> *The essence of leadership...was, and is, that every leader from flight commander to group commander should know and fly his airplanes.*
>
> *Air Vice-Marshall J.E. "Johnnie" Johnson, RAF*

Would an ace pilot from the second world war be able to cope in the hot seat of a modern jet fighter?

Would the best of today's fighter jocks be at home in the cockpit of the legendary Spitfire?

Well, many of the hard lessons learnt over 50 years ago are as relevant now as they were then. However there are enough differences to make the speculation interesting.

In this article I am going to consider the differences and similarities, but with special emphasis on the problems that the World War 2 pilot faced.

In the real world of air combat, over eight out of 10 kills are forgone conclusions by the time the victim knows there is a problem. So if you get involved in a dogfight, you have already given up your best weapon: surprise. It is essential that you become a hunter and not one of the hunted. A modern jet fighter has radar, TVs with magnification and threat indicators to help detect the enemy. In comparison, the WW2 pilot was limited to the Mark I Eyeball. Good eyesight was essential, far more important than it is now. It was also important to use the gift of good eyesight properly; this comes with experience. Inexperienced

pilots would be concerned with flying and not fighting. So here are some tips to help you live long enough to gain your experience.

- Keep the sun behind you. If you have to fly away from the sun, 'tack' away at 45 degrees from the direct course.
- Keep your eyes out of the cockpit. Don't get fixated by the instruments. Relying on the 3D view displayed on the cockpit screens of a typical flight sim will also lead to trouble. In a real aircraft the pilot is not limited to a small tunnel of vision, he moves his head to cover as much of the sky as possible. In Overlord, you need to move to the Inside Lock view to get the same effect.
- Look for relative movement. At the edge of visibility where a stationary aircraft would be invisible, the relative motion of a moving aircraft against the backdrop will give it away. In many flight sims, designers include layers of dots to enhance the impression of speed and perspective. These make it more difficult to pick up aircraft. However relative motion will give away a moving aircraft every time.
- WW2 aircraft did not fly as high as modern fighters. This means that a pilot can also look for aircraft shadows over the ground and sea. Sometimes it is easier to see the shadow than the aircraft casting the shadow.
- Watch out for the messages from your ground controllers and fellow aviators. These should help you to make your search more profitable.

The aggressive spirit, the offensive, is the chief thing everywhere in war, and the air is no exception.

Baron Manfred von Richthofen, Leading Ace of WWI, German Air Service, 80 Victories

- Watch your six and don't rely on the rear view mirror. More often than not, danger comes directly from behind you (your six). Although your mirror gives a view of the area, it is only a very narrow view. Use the Inside Lock view.

- Fly in pairs. A man on his own is a liability, a pair is an asset. Having a buddy close by is like having an extra pair of eyes. Not only that, it complies with the ancient doctrine of concentration of firepower. However, this doctrine resulted in the RAF adopting some very poor tactics in the early months of the World War 2. Large wings of fighters were instructed to fly so close to each other that only the leader could spend any time looking out for the enemy. Many "Tail end Charlies" were shot down before the tactics were discarded in favour of the approach adopted by the Luftwaffe. It is essential that you should fly close enough to provide mutual support but not so close that the act of formation flying requires too much attention.

Once you have spotted the enemy, you should attempt to keep out of his sight. If you have not already done so, move up sun and gain more height and use any cover provided by clouds or high ground. Modern fighter pilots will attempt to move to the rear of the enemy. If the opponent is unattentive it is possible to approach to missile or gun range without detection and without danger. The WW2 pilot did not have things so easy. Some aircraft had rear facing crew with guns. This was a real sting in the tail for an unsuspecting pilot coming in for the kill. So it was important to

> ***He must be able to loop, turn his machine over on its back, and do various other flying "stunts"--not that these are actually necessary during a combat, but from the fact that he has done these things several times he gets absolute confidence, and when the fight comes along he is not worrying about how the machine will act. He can devote all his time to fighting the other fellow, the flying part of it coming instinctively.***
>
> ***Lt. Colonel W.A. "Billy" Bishop, RAF***

identify the aircraft before adopting attacking tactics. For aircraft bristling with guns, an aggressive fast slashing attack would make the most sense. This doesn't give the gunman a chance to take aim. Sometimes aircrew were left at home to increase aircraft range. Once discovered, this would be an unexpected bonus for RAF pilots.

After the attack, get away as quickly as possible using all speed. Only go for the deck as a last resort. At low altitude, small arms fire from the ground can be very dangerous.

A pilot is at his most vulnerable when he is attacking another aircraft. He needs to concentrate his attention on the attack and does not have much time to look around. So get away as soon as possible, there could be a bandit on your tail. Incidentally, target fixation is a real problem in its own right. Pilots have collided with other aircraft, been shot down and hit the ground when they have concentrated on the target to the exclusion of everything else. All this strengthens the argument of flying with a buddy.

You should attack suddenly and aggressively. Be sure of the shot before you open fire. Once the shells start to fly, your position will not remain a secret for very long. One war time commander ordered that tracers be removed from his squadron's ammunition. This removal of the squadron's calling card increased the kill rate significantly.

Now there are no absolutes in air combat. It has been said that if you ask three American pilots the correct procedure given the same set of circumstances in a combat situation, you will get three different answers. Ask three Russians and you will get the doctrinal answer. Who is to say who is right? Anyway, here are a couple of examples to contradict the advice to hold your fire until you are sure of a shot.

In a tail chase where you have an enemy aircraft in front and you are not gaining on him, give him a burst of gun fire. This may scare him into weaving about. This could be enough to slow him down and let you catch up. This next trick was used by Adolf Galland when he found himself in a sticky situation with a Thunderbolt fighter behind him. Galland tried a burst on his guns. The shells had no chance of hitting, they were going in completely the wrong direction. However, the Thunderbolt pilot was so surprised to see smoke and shell cases coming towards him that he broke off the attack. He probably thought he was the unlucky guinea pig for the Luftwaffe's latest weapon: fighters with rear facing guns!

The modern jet will be armed with a range of missiles. One of the major differences between World War 2 and modern fighters is the introduction of guided missiles. These missiles have improved tremendously and now it is much easier to get a kill. The World War 2 fighter was limited to his gun/cannon. Obviously shells don't guide like modern missiles, so this makes combat more difficult, demanding, interesting and stimulating. You have to aim your shells ahead of the target so that the shells and the target arrive at the same point of space at the same time. This is called deflection shooting (see elsewhere).

Once you have made visual contact, don't let the bandit out of your sight. There are two basic problems:

When you start a manoeuvre, the bandit will respond. If you are not looking at him, he certainly will not be where you expect him to be when you finish your manoeuvre.

I scooted for our lines, sticky with fear. I vomited brandy-and-milk and bile all over my instrument panel. Yes, it was very romantic flying, people said later, like a knight errant in the clean blue sky of personal combat.

"W.W. Windstaff," RFC, Anonymous American WWI Ace

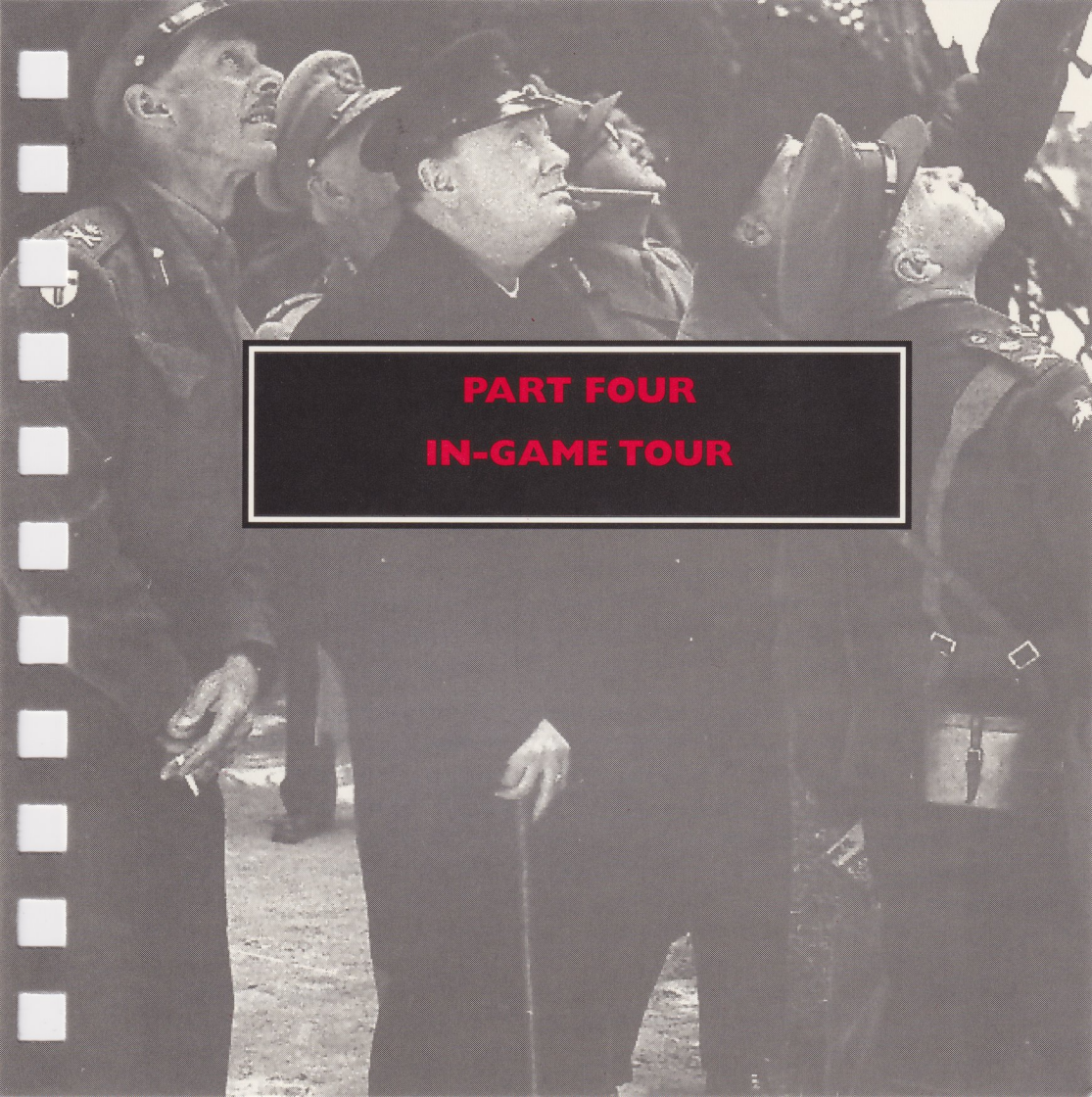
- The bandit can turn away during the moment of your inattention. This could make him almost invisible as he presents a smaller area to you. Also as he is moving away, relative motion will not be enough to pick him out of the backdrop. The distance that the bandit covers in the few seconds you are not looking could give him enough of a lead to get away.

No matter how skillful a pilot is, sooner or later he will find himself in a vulnerable or defensive position. Here are some words of wisdom from fighter pilots:

- The best defensive tactic is a hard and fast offensive movement. At the very least this will unsettle the attacker.
- Don't run from the aggressor, turn towards him. This may make the attacker overshoot.
- If you try to protect something, you protect nothing. Attack is the best form of defence.

In summary then:

1. **spot the enemy first**
2. **get into a strong attacking position**
3. **attack swiftly, suddenly and aggressively**
4. **then get out as quickly as possible**



PART FOUR
IN-GAME TOUR

IN-GAME TOUR

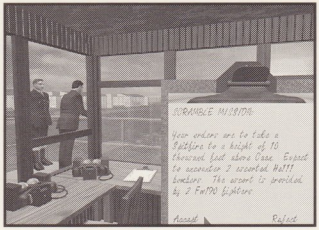
TANGMERE STATION MENU

This is the main menu for Overlord. From here you can reach any station in the game (ie: the Tower, Gatehouse, your Bedroom, the CO's Office, Briefing Room, Dispersal). Selection can be made via mouse or you can toggle through the selections via the <TAB> key on the keyboard.

There will be random occasions when Tangmere will find itself under attack from enemy aircraft. When this happens you will have the option of running for cover for an available trench to dive into (if you are slow with this decision there is a random chance that you will be killed). As an alternative, you will also be able to face the foe by jumping in your cockpit and attempting to get into the air to beat off the Hun. The main problem here is that, as you are taking off, the enemy aircraft will be looking to shoot you up before you leave terra firma.

The Yo-Yo is very difficult to explain. It was first perfected by the well-known Chinese fighter pilot Yo-Yo Noritake. He also found it difficult to explain, being quite devoid of English.

Squadron Leader K.G. Holland, RAF



TOWER MISSIONS

If you arrive at Tangmere and you just want to jump into the air, but you would like a little more control to your combat than the Scramble mission offers you, then you can select the Tower.

Here, you can select what aircraft you want to fly, the height and the position of the combat, the bombers involved in the combat, whether they should be escorted and, if so, by what.

YOUR BEDROOM

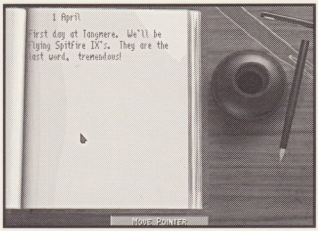
This bedroom is where you , oddly enough, sleep and, more importantly for this game, where your diary is kept. Your diary is kept by all three pilots (i.e.: your three lives - see Noticeboard on p.157 for more information). All the day's events are recorded here. You'll also hear of events and people who surround Tangmere and the goings on therein. Each pilot has his own personality and will record diary entries in a slightly different way, in sympathy to that personality. If you have been grounded or cannot fly due to weather problems then you will find yourself in your bedroom.

The most important branch of aviation is pursuit, which fights for and gains control of the air.

Brig. General William "Billy" Mitchell, USAS

Space in which to manoeuvre in the air, unlike fighting on land or sea, is practically unlimited, and...any number of airplanes operating defensively would seldom stop a determined enemy from getting through. Therefore the airplane was, and is, essentially an instrument of attack, not defence.

Air Vice-Marshal J.E. "Johnnie" Johnson, RAF



DIARY

This is where you will be able to read about the day's events. Move the cursor over red hotspots to see associated illustrations.

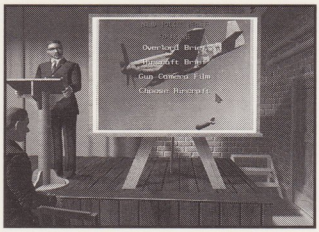
CO's OFFICE

This is where you will receive any awards coming your way.

Medals include the DSC and Bar , DFC and Bar and the VC. There are other 'awards' such as citations from Churchill himself plus a few surprises that we'll let you discover yourself.

Sometimes, an officer will jump on your wing after a mission to inform you that you are wanted at the CO's office. This could be an indication that a medal is on the way. A note will be made regarding the medal or award in your Diary (available in your Bedroom).

Other happenings that could warrant a visit to the CO's Office would be if you have done something wrong - such as shooting down a friendly - or the Spy has some additional intelligence information for you. There is no need to pop off to this office on the off chance of something happening, you will always be informed.



NEW PILOT BRIEF OPTIONS

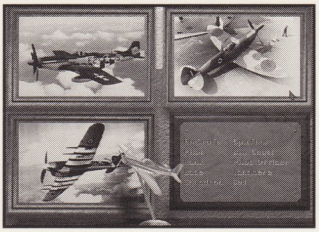
As a new pilot you can choose:

OVERLORD BRIEF: Examine the Overlord situation as you arrive at RAF Tangmere.

AIRCRAFT BRIEF: Look at a breakdown of the aircraft involved in the game.

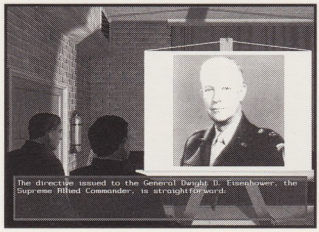
GUN CAMERA FILM: Examine any gun camera film made in flight during a Scramble or Tower mission.

CHOOSE AIRCRAFT: Choose an aircraft to fly in.



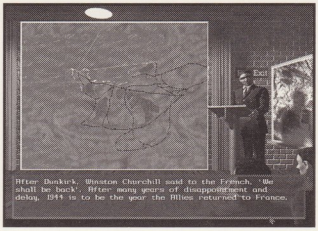
AIRCRAFT SELECTION MENU

Select the aircraft of your choice at this menu. Just click on the required picture.



OVERLORD BRIEFING

If you have selected a briefing of any sort, such as the Overlord briefing as illustrated here, you will be taken to the left-hand side of the briefing room where a full slide/film show will be given along with explanatory text.

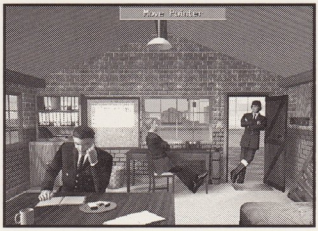


MAP SCREEN

The map screen shows the target area, the list of viable ground targets (red), the railways (black), rivers (blue) and flight waypoints which you should follow to enable you to find your target and your way home (pink). The map screen can be called up in-flight using the hot-key 'M'. This also shows your aircraft as a flashing blue dot and other aircraft in the area Light blue dots are friendly aircraft ; pink dots are enemy aircraft and red dots are mobile targets such as tanks, trains and trucks.

All men can see these tactics whereby I conquer, but what none can see is the strategy out of which victory evolved.

Sun Tzu, 500 B.C.

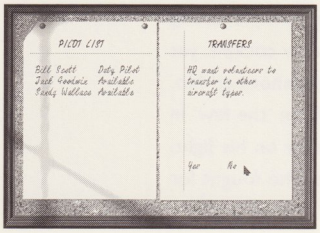


DISPERSAL

This room changes in appearance when you change the type of aircraft you are flying and, hence, the Squadron you are attached to. However, it will always be the place that you can select the Logbook, Noticeboard, Combat Reports and Score board.

Being under fire is bad for the nervous system.

Captain Willy Coppens, Leading Belgian Air Force Ace, WWI, 37 Victories (36 of Which Were Tethered Balloons)



NOTICEBOARD

This is the area in which you can check on the well-being of your pilots. If your pilot is on duty or missing or killed in action, you'll see his fate posted here.

You can also change your aircraft type by transferring to another squadron. You experience no drop in standing or any detriment to your campaign with this option. It has been included in order for you to get to see the other aircraft types relatively painlessly whilst retaining the realistic 'atmosphere'.

When you start the game you are allocated Bill Scott. If he dies then Jack Goodwin takes over and, finally, Sandy Wallace. Three game lives, if you like. The three lives serve as a handle for you to use as a focal point for your control of the entire campaign. This pilot selection process provides one divergence in gameplay. For example...

You should not look upon the pilot as the be-all and end-all. He is not your sole persona. What he does is help connect you with Tangmere and the build-up to Overlord itself. As an example, during flight, if you're Bill Scott and his aircraft is terminally damaged, then you

can (via the use of a keyboard hot-key) jump into another cockpit leaving your last mount to dive to its death. Now, you're in a new cockpit, yet you are still Bill Scott. What? The RAF dabbling in the paranormal? No, it's just that, in Overlord we want to steer you away from 'the few' in favour of 'the many'. So, Bill Scott returns home to carry on his fight. Think of Bill being a symbol for the squadrons of pilots who fought for the Allies.

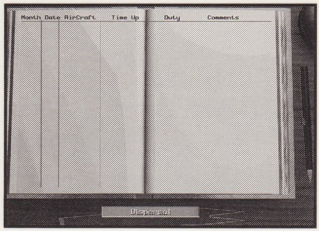
On the other hand...

Okay, if you don't like that idea then you can take the three pilot's personae as individuals in a big war and play Overlord as a one-character game, protecting them with all your might and going down with the ship, as it were, when mortally hit.

This is one example of how free-form Overlord can be.

THE SCORE

Available in the Dispersal area, the Score rudder gives you all of your kill statistics, broken down into individual target types and hits types.



LOGBOOK

When you have completed a flight the results of the flight are recorded in the Logbook.

EXTERNAL VIEW

There are many external viewpoints to select in Overlord. However, if you are concerned about losing control of your aircraft whilst at this view then the performance bar at the base of the screen will provide all of the information you require.

On the top line of the box is the information for the aircraft you are flying in.

The second line, after the Next WP (Next Waypoint) is a selectable mission profile (use keys ';' & '" to toggle through the different waypoints). Using this system you can guide the other aircraft in your flight to change their mission profiles. The missions are:

Navigation: Fly to the next waypoint

Attack: Attack the selected target

Land: Land at the home base

The Rel Bearing (Relative Bearing) is a bit like the carat shown on the HUD of many jet simulations. That is, if you move your aircraft so that the relative bearing reads '0' you will be on the waypoint's course. The range is the distance to the next waypoint. The altitude is the altitude you should be at the next waypoint in order to achieve the objective.

The third line shows the position information. Hence, select the object of your choice (SHIFT ;) and information regarding its position will be offered. Objects can either be:

Home
- your home base

Opposition
- Your goal or target

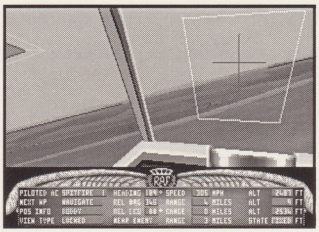
Escortee
- The bomber you are escorting

Buddy
- Information about your buddy or wingman

The bottom line gives you information for the view type and viewee that you have selected.

*Those poor b******s. They've got us right where we want 'em. We can shoot in every direction now.*

Lt. General Louis "Chesty" Puller, upon learning he was surrounded



INSIDE COMBAT LOCK

The problem with most flight simulations is that, during flight combat, your view is fixed forwards. In effect, you are given a small window onto the outside world without any peripheral vision. Options for turning your head are restricted to cumbersome key/view changes that plant your view left/right/back. It does the job but without fluidity and, if you're grappling to keep a bead on a bogie, it is unusable in the tension of combat. There are other flight simulation examples that allow the game view to roam freely around the cockpit in a realistic 3D mode, tracking the target around the sky with ease and allowing you to keep your eye on all air bogies. The trouble with this system is that it often results in disorientation for the player which can be catastrophic for your combat situation as you lose your mental positioning in the sky. Overlord's 'Inside Combat Lock' solves all of these problems.

When you switch on the Inside Lock view, via the <BACKSPACE> key, the normal cockpit view disappears and a floating view appears. It looks like you are sitting on a higher chair inside the cockpit itself. This view position was created to remove those instruments that

Everything I had ever learned about air fighting taught me that the man who is aggressive, who pushes a fight, is the pilot who is successful in combat and who has the best opportunity for surviving battle and coming home.

Major Robert S. Johnson, USAAF

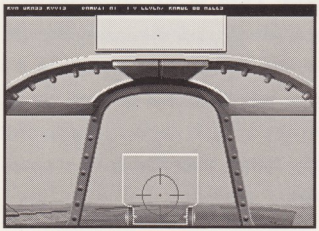
get in the way of your outside view.

The first thing that the Inside Combat Lock does is to look for a flight target. If it finds one then it will 'lock' onto it and follow it wherever it goes, until you ask the Inside Combat Lock to do otherwise (see Keyboard Reference Chart). This allows you to track the enemy aircraft, as if you were turning your head in the cockpit, and anticipate it's manoeuvres when it would normally be out of normal forward vision. Hence, you can manoeuvre your own aircraft and perform productive manoeuvres to counter enemy moves rather than having to second-guess an out-of-sight out-of-mind bogie.

Now, this is all very well. Such a floating viewpoint is, in this day and age, nothing new. The difference in Overlord's Inside Combat Lock viewpoint is how the Lock prevents you from becoming disoriented. It does this by providing you with noticeable orientation markings that never get in the way. At the front of the cockpit you are provided with a gunsight, on both sides of the cockpit is a stretched arrow pointing towards the front of the aircraft. Finally, at the top of the canopy is a squashed arrow presented in a denser shade to differentiate between the top and sides of the canopy. Couple the arrows with the usual additional furniture and canopy framing that you would normally expect to see in a cockpit and you have a perfect combat utility that, for the first time in a simulation, presents a usable combat viewpoint.

When using the Inside Combat Lock, practice with it for a few Scramble

missions. Of course, it'll be strange to use at first but you will quickly become used to the orientation and Inside Combat Lock will become second nature to you.



REAR-VIEW MIRROR

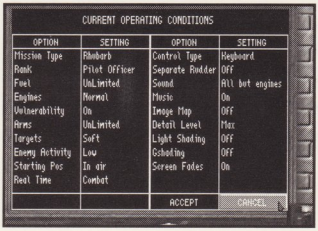
Using the square brackets on the keyboard (i.e.: [&]) you can examine the rear-view mirror for those enemy aircraft who like to sneak up on your 'Six'.

The important thing [in tactics] is to suppress the enemy's useful actions but allow his useless actions. However, doing this alone is defensive.

Miyamoto Musashi (1584-1645), Japanese Samurai & Philosopher

There is a peculiar gratification in receiving congratulations from one's squadron for a victory in the air. It is worth more to a pilot than the applause of the whole outside world. It means that one has won the confidence of men who share the misgivings, the aspirations, the trials and the dangers of aeroplane flying.

Captain Edward V. "Eddie" Rickenbacker, USAS, Leading US WWI Ace, 26 Victories



CURRENT OPERATING CONDITIONS

This screen is the core of the Overlord engine as it controls all of the variables in the game. This screen allows you to modify some of the important variables in the game.

MISSION TYPE

This option allows you to override the mission chosen by the computer.

CIRCUS - Escort bombers.

There are three types of Circus mission:

RAIL - Attacking the larger Marshalling Yards

AIR - Attacking airfields

BATTERY - Attacking coastal batteries

Circus missions are handy to use when you need some heavy bombs to destroy a target, such as those listed immediately above.

TRANSPORTATION PLAN - A set of fighter missions. There are eight small Marshalling Yards and eight large Yards. If a previous Circus mission has damaged, but not destroyed, a large Marshalling Yard, then the fighters will be tasked to finish it off. This is all related to the categorisation of targets that the AEAF used:

Category A: destroyed
Category B: damaged
Category C: undamaged

If there are no Category B large Marshalling Yards then one of the eight small Yards will be targeted.

RANGER - This is a Sweep mission. A Sweep is a general mission, flying over France looking for trouble. In this case your Squadron Leader chooses which mission you should fly.

RODEO & RHUBARB - These are both Sweep missions to hit coastal and secondary waypoint targets. However, Rodeo involves more aircraft on the attack than Rhubarb.

TRAINS - Another Sweep but the computer encourages more trains to hit the tracks than would normally be the case.

BRIDGES - Attacks against one of eight bridges that cross the River Seine. In this mission you will be carrying rockets (Typhoon) or bombs (Spitfire or Mustang). You will have escorts on this mission.

RADAR - Similar to the Bridges mission. Here you will be hitting one

We wanted a man of the calibre of Boelcke or Mannock or Molders or Malan to explain the unknown and to clear out our confused and apprehensive minds; but on this occasion the right senior officer was not present.

Air Vice-Marshal J.E. "Johnnie" Johnson, Leading RAF Ace in Europe, WWII, 38 Victories

of eight radar stations. Again, you will carry rockets or bombs and will be escorted.

ROADSTEAD - This is a Sweep against boats.

RANK

The increases in ranks signify an increase in the difficulty level of the game in general. For example, if you selected the highest rank you would, automatically, toggle the other options on this screen to more realistic and/or tougher selections. If you begin at the lowest rank you will, during the course of the game, be promoted which will, again, increase the difficulty levels on a relative basis.

If you come back from an operation with a kill but without your wingman, you lost your battle.

Lt. Colonel Dietrich Hrabak, Luftwaffe, 125 Victories, WWII

FUEL

Either historical or unlimited.

ENGINES

The engines either work as they did historically or, if you select Super Engines, the engines will perform without any problems. They will also run 50% faster. This increase in speed allows for 'smoother' engine performance.

VULNERABILITY

Select this option to make your aircraft indestructible or open to damage.

ARMS

Weapon numbers are either finite and historical or unlimited.

TARGET

An Easy target selection means that the object kill volume is larger than the shape. Medium means that the kill volume is about the same size as the shape. However, the Hard selection means you must centralise your hit to kill the target.

ENEMY ACTIVITY

This alters the enemy's ability to manoeuvre - from hardly any manoeuvres to an enemy who will do his damnedest to out-turn and out-manoeuvre you.

> ***Orders to protect fixed objects are very much disliked by fighter pilots. Their element is to attack, to track, to hunt, and to destroy the enemy. Only in this way can the eager and skilful fighter pilot display his abilities to the full. Tie him to a narrow and confined task, rob him of his initiative, and you take away from him the best and most valuable qualities he possesses: aggressive spirit, joy of action, and the passion of the hunter.***
>
> ***Lt. General Adolph Galland, Luftwaffe***

STARTING POSITION

When beginning the mission you can start on the tarmac in your home base or in the air on the way to a mission target.

REAL TIME

Visible means that, when you automatically come out of Acceleration Mode, you will stop within visible range of the enemy, about eight miles. Combat means that you will come out of Acceleration Mode within combat distance or around a mile from the enemy.

CONTROL TYPE

A good fighter pilot must have one outstanding trait—aggressiveness.

Major John T. Godfrey, USAAF

Joystick - This is a standard joystick with two axes and two fire buttons (A and B). However, if you have a second joystick connected, the fire buttons on that stick can also be used as buttons C and D.

Joy-Throttle - This joystick also has an additional independent lever that can be used as a throttle, controlling the aircraft's fuel intake and RPM. There may be up to four fire buttons. If you have a standard Flightstick or a Maxx Yoke then this option should work with them.

FlightStick Pro - The FlightStick Pro has a throttle to control RPM on the base and a "coolie hat" on the top of the stick which provides four extra switches.

Thrustmaster - The Thrustmaster PFCS has a 'coolie hat' on the top of the stick which provides four extra switches.

Recalibrate - This option allows you to re-centre your joystick if you notice a tendency to yaw or pitch when the joystick is centred. Note that certain events in the simulation also have this effect, so it is worth checking that the rudder is centred and the gear is up before blaming the joystick. Having changed this option the joystick will have to be calibrated after you 'accept' the changes. See later section for details on this procedure (Page 172)

SEPARATE RUDDER

If you have separate rudder pedals you will need to toggle the separate rudder selection.

SOUND

Turn sound on, off or have all the sound on bar the engine's.

MUSIC

Turn music on or off.

DETAIL LEVEL

Allows you to manually select the detail level according to your PC type: 386, 486, 486 33Mhz or Faster. However, this manual method does not take your individual PC's features into consideration. For example, a particularly fast video card, a slow memory management system and so on might affect your selection. Hence, experimentation is a wise move.

When flying low over water or desert, adjust your height so that you can see your shadow on the surface; then, in addition to your routine gentle weave, look out, watching the water for other shadows sneaking up behind yours; these may represent unfriendly aircraft.

Group Captain Reade Tilley, RAF

AUTO DETAIL

This system automatically turns off detail that is beginning to slow down your PC. It does this on the fly, turning off and on detail as you progress throughout the sky.

AUTO WINDOW

This system is an alternate detailing system that offers the additional feature of automatically reducing the size of the window onto the outside world if your PC cannot handle the flight detail. It does this on the fly reducing and increasing the window size when necessary.

SCREEN FADES

Toggle on or off. Faster machines might like to leave this on - well, it looks pretty. However, slower PCs might benefit with this option turned off as screen fades eat up CPU power.

JOYSTICK CALIBRATION

After changing the joystick option and choosing accept you will be asked to move the joystick controls in order to calibrate the game to your joystick. On the PC and AMIGA there are a number of factors which can effect the operation of the analogue joystick and it is necessary to go through this process in order to get the best from it. First, ensure that any auto-fire devices are turned off. These will not be useful in this simulation and will confuse the calibration process.

ALL JOYSTICKS

For all joysticks you will be asked to:
"Centre Stick & Press Fire Button"
Then you will be asked to:
"Move Stick thro' full movement"
"& Press Fire Button"

Make sure that you push the stick to its maximum deflection in each of

the four sides. On some joysticks the maximum deflection is in the corners, on others it is in the middle of each edge, so to be certain of covering all the positions you should run along each edge and into each corner before pressing the joystick fire button.If the joystick is not connected then after a few seconds the following message is displayed and the keyboard will be selected as the flight control device:

"CALIBRATION ERROR"

"Press Enter"

You may also see the message:
"Warning: Poor Calibration"
"Press Enter"
This means that in order to accommodate a small reading on one side of the joystick there will be a large dead area on the opposite side. You may find that flight control is still acceptable, in which case you may ignore the warning, or you may wish to use the trim controls on your joystick to give better centring.
This is the end of the joystick configuration for normal joysticks.

I decided to make a run on this [Japanese Zero]. He never changed his course much, but started an ever-so-gentle turn. My Corsair gradually closed the gap between us. I was thinking: "As long as he is turning, he knows he isn't safe. It looks too easy." Then I happened to recall something I had experienced in Burma with the Flying Tigers, so I violently reversed my course. And sure enough, there was his little pal coming along behind. He was just waiting for the sucker, me, to commence my pass on his mate.

Colonel Gregory "Pappy" Boyington, USMC

FLIGHTSTICK PRO AND THROTTLE CALIBRATION

For the FlightStick Pro and Throttle joysticks there are two extra request screens. These vary depending on whether you have also selected analogue rudder pedals.

If you have not selected rudder the first screen reads:

"Min Throttle" "& Press Fire Button"

You may arbitrarily decide to make your throttle work in either direction so you can choose either end as the minimum.

If you have also selected Rudder pedals then this request will read:

"Min Throttle" "Centre Pedals" "& Press Fire Button"

If the screen times out, or the throttle or pedals cannot be detected then following message is displayed and the keyboard will be selected as the flight control device:

"CALIBRATION ERROR" "Press Enter"

If you have not selected rudder the second screen will then ask you:

"Max Throttle" "& Press Fire Button"

You should move the throttle control to the opposite extreme, then press the joystick fire key. If you have selected rudder the second screen will ask you:

"Max Throttle"

"Move Pedals thro' full movement"

"& Press Fire Button"

As well as moving the throttle to the opposite extreme you should also press down each of the rudder pedals in turn before pressing the joystick fire key.

If the centring of the rudder pedals is poor then you may be warned:

"Warning: Poor Calibration" "Press Enter"

This means that in order to accommodate a small reading on one side of the pedals there will be a large dead area on the opposite side. You may find that flight control is still acceptable, in which case you may ignore the warning, or you may wish to use the trim controls on your pedals if you have any to give better centring.

The coolie hat on the FlightStick Pro does not require calibrating.

THRUSTMASTER CALIBRATION

For the Thrustmaster PFCS coolie hat there are two additional request screens. These vary depending on whether you have also selected analogue rudder pedals.
If you have not selected rudder the first screen reads:

"Centre Coolie" "& Press Fire Button"

If you have rudder selected the screen will read:

"Centre Coolie" "Centre Pedals" "& Press Fire Button"

The coolie centre position is the position it returns to when released. If the screen times out, or the coolie hat or pedals cannot be detected then the following message is displayed and the keyboard will be selected as the flight control device:

"CALIBRATION ERROR" "Press Enter"

NOTE: If you have also attached the WCS (Weapon Control System) you can either calibrate the PFCS as a standard joystick and use the keyboard mapping program to activate the coolie hat or set the mode switches to TEST and ANALOGUE on the WCS.

If you have not selected rudder the second screen will then ask you:

"Move Coolie thro' full movement" "& Press Fire Button"

It is important that you push the coolie-hat into all four possible positions.
If you have selected rudder the second screen will then ask you:

"Move Coolie thro' full movement"
"Move Pedals thro' full movement"
"& Press Fire Button"

It is important that you push the coolie-hat into all four possible positions, and press down each of the rudder pedals in turn before pressing the joystick fire key.
If the centring of the rudder pedals is poor then you may be warned:

"Warning: Poor Calibration"
"Press Enter"

This means that in order to accommodate a small reading on one side of the pedals there will be a large dead area on the opposite side. You may find that flight control is still acceptable, in which case you may ignore the warning, or you may wish to use the trim controls on your pedals if you have any to give better centring.

If you have Thrustmaster's WCS Mk.II, which attaches to the keyboard port and can emulate the keyboard keys that control the throttle, as well as any other functions, here are the keys that can be used for that unit:

/?	Boost throttle
.>	Max throttle
shift =+	Continuous large increases
pad +	Single large increase
=+	continuous small increases
shift pad +	Single small increase
shift pad -	Single small decrease
_	continuous small decreases
pad -	Single large decrease
shift -_	Continuous large decreases
,<	Min throttle

RUDDER PEDALS

If you have selected Thrustmaster or FlightStick then you have already configured the rudder. If you selected joystick and rudder pedals then the following two additional screens will calibrate the rudder. Screen 1 requests:

"Centre Pedals" "& Press Fire Button"

If the screen times out, or the pedals cannot be detected then following message is displayed and the keyboard will be selected as the flight control device:

"CALIBRATION ERROR" "Press Enter"

The second screen will then ask you:

"Move Pedals thro' full movement"

"& Press Fire Button"

Press down each of the rudder pedals in turn before pressing the joystick fire key. If the centring of the rudder pedals is poor then you may be warned:

"Warning: Poor Calibration" "Press Enter"

This means that in order to accommodate a small reading on one side of the pedals there will be a large dead area on the opposite side. You may find that flight control is still acceptable, in which case you may ignore the warning, or you may wish to use the trim controls on your pedals if you have any to give better centring.

JOYSTICK CONTROLS

The basic joystick provides elevator (pitch) and aileron (roll) controls, and two fire buttons. Button "A" fires the guns. Button "B" switches between guns and other weapon types.

There are two additional buttons fitted to many extended joysticks:
Button "C" switches to track view
Button "D" steps though the available targets in"Nearest Friendly", "Nearest Unfriendly", and "Nearest ground target" views.

When available, the throttle controls the RPM of the aircraft.
When available, the four positions of the coolie hat are used to select additional views and aircraft controls:

front: engages and disengages boost

back: engages and disengages air-brakes

left: switches to an inside lock view of anything currently being viewed

right: switches to an outside lock view of anything currently being viewed

TECHNICAL INFORMATION FOR ADVANCED JOYSTICK USERS

It is possible to take advantage of the rudder throttle, and additional fire keys using two joysticks attached to a two-port joystick card or using a joystick 'Y' splitter. Note that basic 'multi i/o' cards fitted as standard in many machines often only implement the standard two axes of one joystick, so a 'Y' splitter, or an extended joystick, will not work with these cards. On the second joystick the trim control of the 'Y' pitch axis can be used as the throttle and the left-to-right movement of the joystick can be used for rudder. This is similar to a model aircraft radio controller. In addition the two extra buttons can be utilised.

The joystick configuration data is held within the player record and could be binary edited by the experienced user to define a more customised configuration of the joystick interface than is possible using the program. This editing allows a few additional permutations of analogue devices to be created, the curve of the stick to be modified, clipping of 'noisy' sticks, and the remapping of the joystick switches to different keys.

The Joystick configuration block is in the SAVEGAME*.SAV file.
There are numerous other game control flags in this file.
Changing a named player record, e.g. SWORD.SAV, will only effect that game, but modifying NEWPLAY.SAV will effect any new games.
The joystick block starts with the ascii text 'STIK'. This is followed by the translate table for the elevators. This table is 64 bytes long and is indexed with absolute joystick Y position scaled to the range 0 to 63. It should return a value in the same range. This is followed by six overflow entries for elevator making 70 entries in total.

This is followed by the translate table for the ailerons. This table is 64 bytes long and is indexed with absolute joystick X position scaled to the range 0 to 63. It should return a value in the same range.
This is followed by six overflow entries for aileron to make 70 entries in total.

This is followed by the scaling and centring factors needed by the program for each stick axis. These can vary depending on the speed of the machine, the brand of interface, and the joystick itself. Once set, however, it may be useful to make slight modifications to the values. For each axis there is a word reading for the centre, and a word reading for the distance between centre and closer edge. The order of the words is:
CentreX1, CentreY1, DistanceX1, DistanceY1
CentreX2, CentreY2, DistanceX2, DistanceY2

This is followed by a word defining the current controller mode:
Basic modes:

0	Keyboard
1	2 axis joystick
2	Y2 axis used for Throttle
3	Y2 axis used for Thrustmaster coolie hat
+4	X2 axis used for rudder
+8	Button patterns used for FlightStick coolie hat

It is possible therefore to use rudder without joystick, the FlightStick Pro button patterns with a normal 2 axis stick, or just the Flightstick switches and no joystick.

This is followed by the keyboard mappings for the various switches on the joystick. There are up to four buttons, and four positions on the coolie hat.

Button A is reserved for fire. The other seven switches are encoded as two consecutive bytes defining the scancode and simultaneous shift keys. The values for scancode can be found in PC references. The values for shiftkeys are:

1 Normal - key on its own

2 Shift key pressed simultaneously

4 Alt key pressed simultaneously

8 Ctrl key pressed simultaneously

Only the initial press event is detected by the program for the switch translations, so they cannot be used to emulate keys that are normally held down in use - such as the outside view rotates.

The order of the switch codes is:

Switch	Default use	Key	Encoding
Button B	Weap sel	Pg Up	01 49
Button C	track view	F6	01 40
Button D	next viewee	Alt F	04 21
Coolie Left	Inside lock	F9	01 43
Coolie Back	air brakes	b	01 30
Coolie Right	Outside lock	F8	01 42
Coolie Forward	Boost rpm	slash	01 35

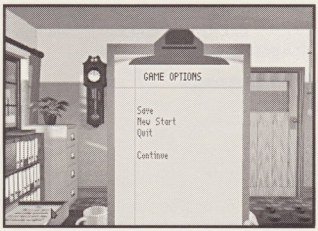
The encodings for the coolie hat are as follows:

Coolie hat position	Thrustmaster axis Y2	FlightStick Pro buttons
centred	100%	
left	75%	AB—
back	50%	ABC-
right	25%	AB-D
forward	0%	ABCD

Those building their own sticks may like to note that our code allows +/- 10% tolerance in the Thrustmaster position reading, and that the Flightstick Pro blocks multiple button presses except for the patterns above for the coolie hat.

1. *Try to secure advantages before attacking. If possible, keep the sun behind you.*
2. *Always carry through an attack when you have started it.*
3. *Fire only at close range and only when your opponent is properly in your sights.*
4. *Always keep your eye on your opponent, and never let yourself be deceived by ruses.*
5. *In any form of attack it is essential to assail your opponent from behind.*
6. *If your opponent dives on you, do not try to evade his onslaught, but fly to meet it.*
7. *When over the enemy's lines never forget your own line of retreat.*
8. *Attack on principle in groups of four or six. When the fight breaks up into a series of single combats, take care that several do not go for one opponent.*

Captain Oswald Boelke, German Air Service, 1916, 40 Victories



GATEHOUSE

This is where you can restart, save or quit the game. If you have accessed this screen by mistake just click on 'Continue' to return to the Tangmere menu screen.

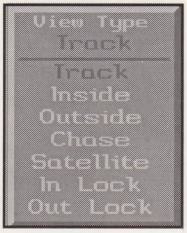
PART FIVE
VIDEO EDITING SUITE

VIDEO EDITING SUITE

TITLE BAR

This strip runs along the top of the Video Editing Suite and tells you what Filename the present video relates to, the Position (within RAM) that the current video frame is in and the Last Page (of RAM) that the video ends at.

VIEW TYPE SELECTOR



The red label shown at the top of this box is the selected viewpoint.

INSIDE - The view within the aircraft's cockpit.

OUTSIDE - The view outside your aircraft.

CHASE - As if you are flying behind your piloted aircraft in a 'chase' plane.

SATELLITE - A look-down viewpoint

IN LOCK - Locks on to an external object looking from your cockpit

OUT LOCK - Locks on to an external object but this time you are looking at it from outside your aircraft

VIEWEE SELECTOR

The Selected viewee position is always shown in red text.

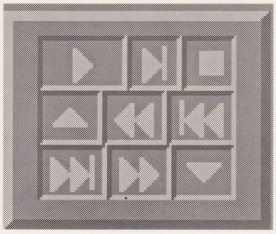
PILOT AC: This shows the view in the aircraft's cockpit.

NR GROUND: This selection shows the nearest ground target to you.

HOME BASE: Shows Tangmere.

NR UNFRND: Shows the nearest enemy aircraft to your aircraft.

NR FRIEND: This option shows the nearest friendly to you.



MOVEMENT BLOCK

Moving from left to right and then downwards the buttons are:

PLAY/PAUSE - Play the video or pause it at a particular frame

MOVE FORWARD ONE FRAME - Move the video film a single frame forwards

STOP - Stop the video

REWIND TO BEGINNING - Rewind the video to the beginning of the entire video

FAST REWIND - Rewind the video at an accelerated pace

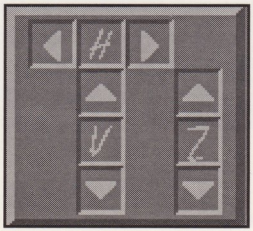
REWIND ONE SECTION - Rewind the video one section

FORWARD ONE SECTION - Move one section forwards

FAST FORWARD - Move the video forward at an accelerated pace

FAST FORWARD TO END - Move the video forward to the end of the entire video

Note: A section is an area of EMS RAM totalling 16K in size.



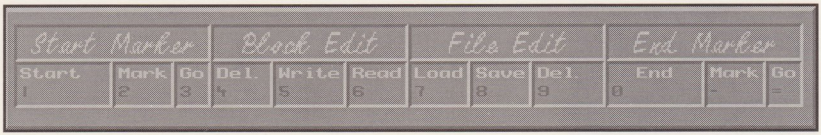
ZOOM & ROTATE KEYS

H = Horizontal. The left and right arrow keys allow you to rotate left and right

V = Vertical. The up and down keys allow you to rotate up and down

Z = Zoom. The up and down keys allow you to zoom in and out

NOTE: With the rotation keys, click once to start the rotation and again to pause the action. When you click on either H, V or Z keys you will reset to the default setting for that command.



MARKER BOX

All symbols [i.e.: 1, 2, 3,] within this block are keyboard hotkeys

Start Marker

START: Places the Start Marker at the beginning of the video. That is, position '0'.

MARK: Places Start Marker wherever you are on the video 'tape'.

GO: Go directly to the Start Marker.

Block Edit

NOTE: The definition of a 'Block' is a section of video that has been bracketed with a 'Start' and 'End' marker.

DEL: Delete a block of video you no longer want.

WRITE: Write a block of video to disk.

READ: Read a block to RAM. That is, this option allows you to insert a block of video from the disk to the video already in RAM at the current position.

File Edit

LOAD: Remove a video in memory and load in a new video from the disk.

SAVE: Save the current video to disk.

DEL: Delete a video from the disk.

End Marker

END: Places the end marker at the very end of the entire video.

MARK: Place the End Marker wherever you are on the tape.

GO: Go to the End Marker

FLAGS

The following flags work in conjunction with the other options on the Video Editing Suite. All of the options are hot-keyed to respond to their first letter (e.g.: the hot-key for Viewee Fix is 'V').

VIEWEE FIX /FREE: Toggled as 'Fixed' or 'Free', this option moves the view to the nearest object (i.e.: Free) or fixes the viewpoint to the nearest object and then fixes upon it, following it wherever it goes. The latter option is handy to follow an aircraft within a crowded sky.

COCKPIT OFF/ON: Toggles the cockpit on or off. When 'off ' the cockpit disappears and you get a 'window' onto the outside view.

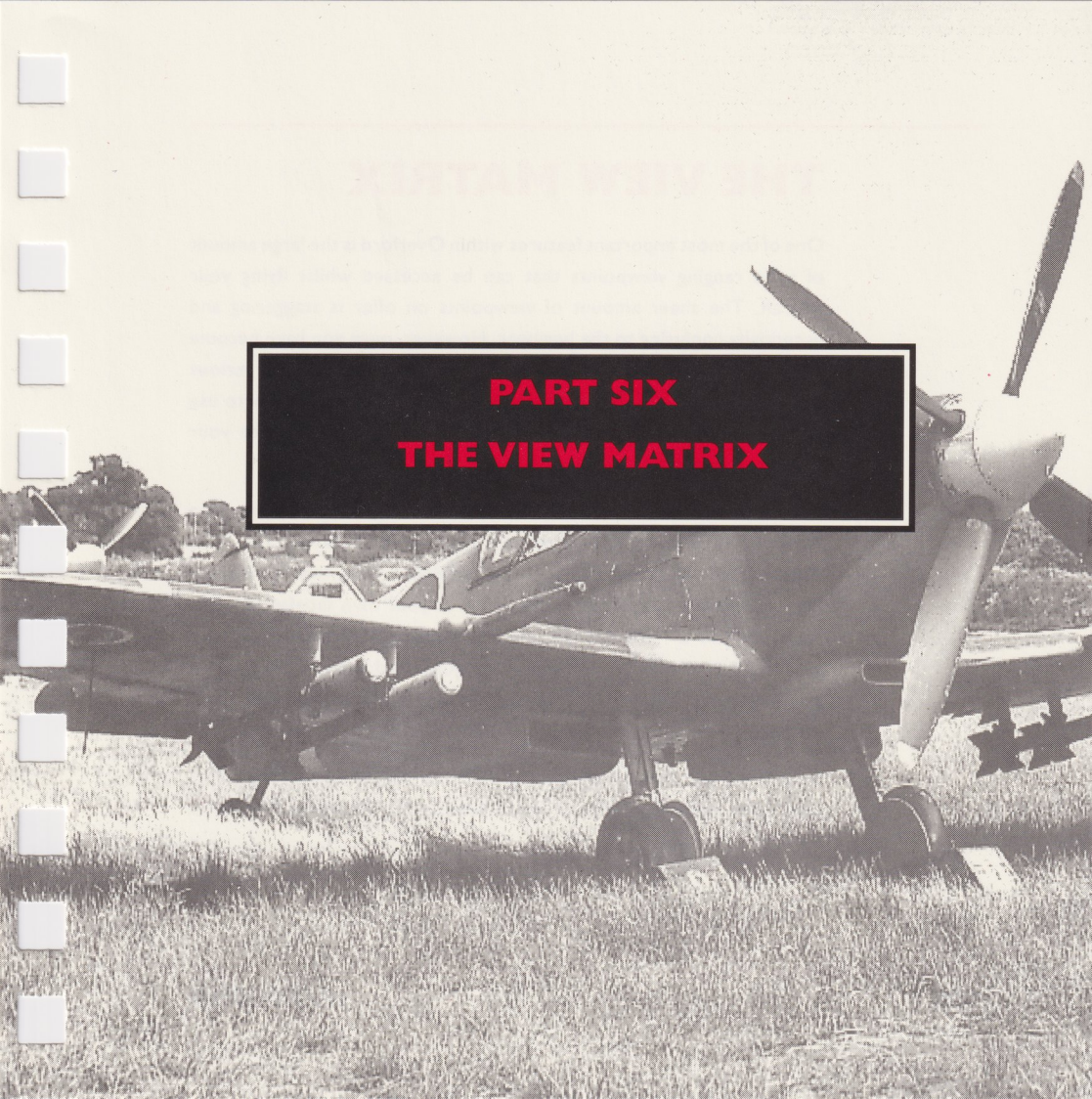
TIME NORM/ACCEL: Gives you normal time or accelerated time.

NEXT ITEM: If you have selected the VIEWEE FIX option then this selection moves your view to the next available 'fixed' item.

MSL VW OFF/ON: This toggles the missile (which can be a rocket/bomb/gun) on or off. If 'On', you will follow launches that have been recorded.

IMPT VW OFF/ON: If toggled 'On' then just before your weapon hits the target you are whisked to the target to see it blow up and expel smoke, etc. Then you are taken straight back whence you came.

Typhoon IB



PART SIX
THE VIEW MATRIX

THE VIEW MATRIX

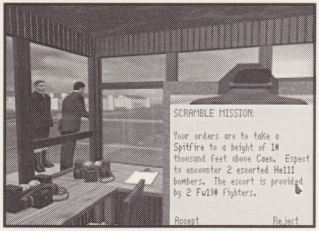
One of the most important features within Overlord is the large amount of wide ranging viewpoints that can be accessed whilst flying your aircraft. The sheer amount of viewpoints on offer is staggering and potentially confusing to the beginner. However, once you have become accustomed to the game and have experimented with the various viewpoints (see the Keyboard Reference charts) you will be able to use the View Matrix, as the Overlord viewing system is known, to your advantage (see below).

It must be stressed, however, that the View Matrix is not, merely, a bunch of random viewpoints thrown together haphazardly. The View Matrix is unique in that it allows you to select a view, then it requests how you would like to modify that view to your own satisfaction. The large amount of viewable combinations that are possible using this system gives you just about any scene you could wish to have at any position in the sky and in response to any situation that you might encounter.

To give you some idea of what can be achieved using the View Matrix let's take three mission profiles to act as vehicles for the viewable options.

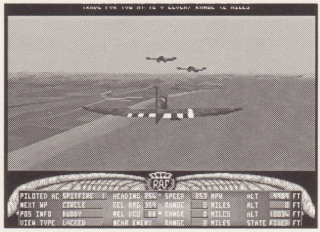
AIR COMBAT

To begin with, from the initial main Tangmere menu, select the Tower. Then select the default mission to get up into the air.

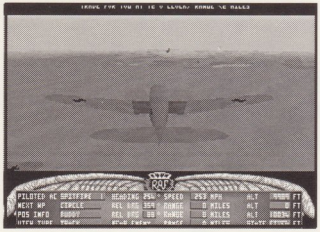


Once up in the air, with the sky full of unfriendly aircraft, press the <ENTER> key to get an Outside Lock of the nearest unfriendly aircraft. Because you can see the piloted aircraft in the foreground it is easy to understand the combat situation.

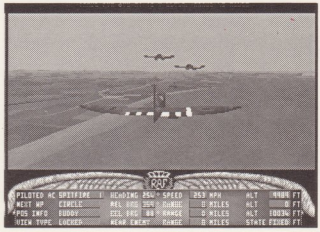
Next, type <ALT F> to step through the enemy aircraft in the sky. This gives you some idea of what you are up against in terms of total numbers.



Once you've spotted your target aircraft you can obtain a track view by pressing <F6>.

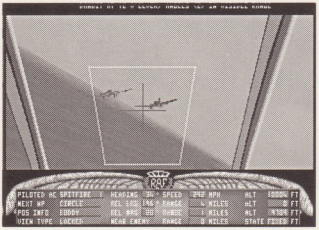


To get a different viewpoint of this aircraft you can press <ENTER> again to obtain an Outside Lock of the target aircraft.



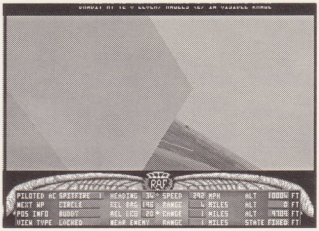
Now that the enemy aircraft have been examined you will want to manoeuvre your aircraft into a favourable position to press home your attack. A rear attack, for example. You may wish to press '7' for a traditional cockpit view.

Once you have positioned yourself into this favourable position you may wish to revert to the Inside Combat Lock to prosecute the kill <BACK-SPACE>.



The Inside Combat Lock is invaluable to maintain a visual fix on your target, especially if they decide to manoeuvre away from you. If you get disoriented pressing <ENTER> to get the Outside Lock will allow you to become oriented.

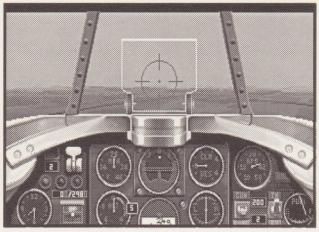
If another enemy becomes a threat you can also use <ALT F> to target it. This view shows a possible threat which is present over your left shoulder. You can see part of your seat, the bogie is still a small dot on the horizon.



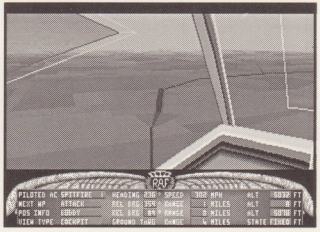
Pressing <SHIFT F> will free the lock so that the view is automatically changed to the nearest aircraft. This will prevent surprises. However, you will have to balance the advantages that this view can offer with the possible disadvantages of the view changing just as you are about to make a kill.

GROUND TARGET

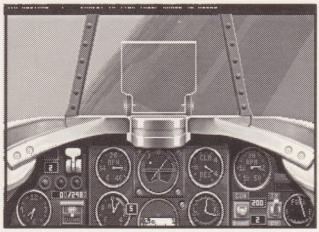
Now for a ground mission - let's hit a bridge. Select this mission via the current operating conditions' screen (P. 165). To begin the mission, you must select bombs via the weapon selector <PG UP>.



To take a look at the target, as you approach the bridge, select <SHIFT F8> to move to the inside lock of the target.

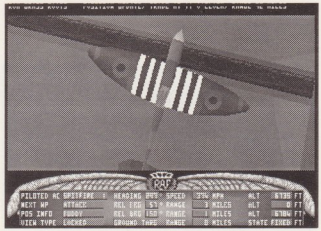


If you need to shift to the front cockpit instruments hit '7'.

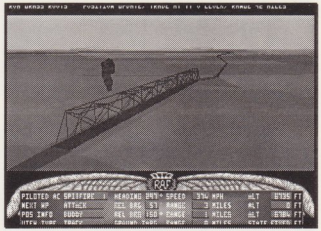


Check out your situation and then fly until the target is 90° relative bearing. Next, you must wing over to get the bridge onto the centre screen. This should involve a dive. When bomb aiming, the cross-hair should just be behind the target.

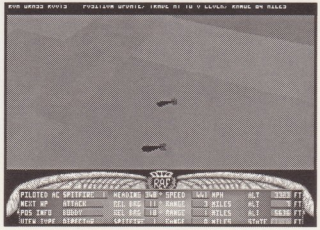
There's a wide selection of views that can be utilised at this point. For example, <F8> will give you an Outside Lock of the target.

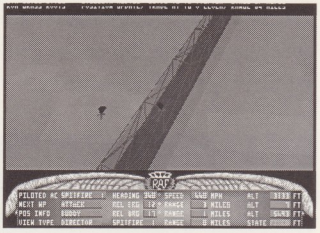


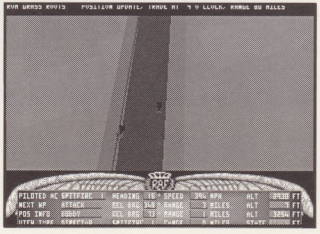
<F6> gives you another view, the Track View of the target. Here, you can see that your wingmen are already attacking the bridge, this attack resulted in a near miss.



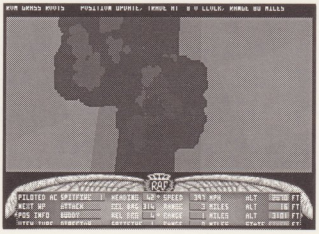
'X' gives you a Missile viewpoint, In effect, in this case, you follow the bombs down to the ground.







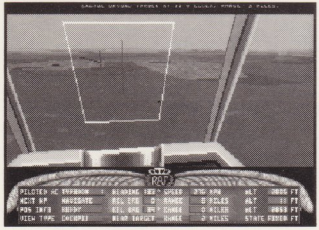
Selecting 'Z' gives you the Impact toggle to give you a close-up viewpoint of the target as it is hit.



SWEEP

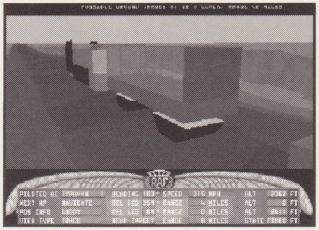
To finish this brief look at the View Matrix let us fly a typical Rodeo Sweep over the French coast. Select this mission via the current operating conditions' screen (P. 165).

Once in the air key <SHIFT F9> to check out the nearest ground target. In this case it's a juicy E-Boat.

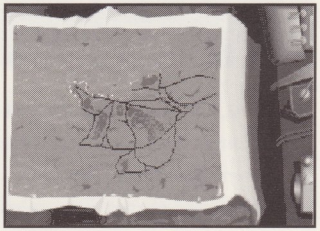


Switching to <F6> gives you a close-up view of the E-Boat within the nearest target Track View.

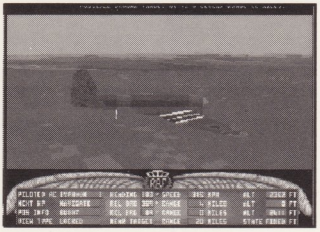
Then <ALT F> steps through each of the remaining targets that lie in your immediate area. This allows you to quickly change your mind and re-target. For example, here's a train.



On the other hand, you might want to hit the 'M' key to access the in-flight map and select a new target this way.



When you have finally made your decision (we'll stick with the E-Boat for now) regarding your selected target you can select <F8> to get an Outside Lock of the target. No, we haven't made a mistake, your aircraft isn't that target. The E-Boat target is shown at some distance. However, your aircraft is in shot to give you a relative bearing as to the position of your aircraft and its target.



Then you can fly towards the target to finalise your attack position. To help you to establish your perfect attack posture try hitting <F9> to move to the Inside Lock and then initiate the attack.

GENERAL ADVICE FOR VIEW KEYS:

The Shift & Function plus Shift & Numeric keys give you a view of something.

The Numeric and Function keys by themselves define what you want to do with that view.

PART SEVEN
KEYBOARD REFERENCE

KEYBOARD REFERENCE

NORMAL KEYS

1 ..... Increases the keyboard flight control sensitivity
2 ..... Decreases the keyboard flight control sensitivity
5 ..... A view of the rear of your aircraft's cockpit, from the inside.
6 ..... A view of the left of your aircraft's cockpit, from the inside.
7 ..... A view of the front of your aircraft's cockpit, from the inside.
8 ..... A view of the right of your aircraft's cockpit, from the inside
9 ..... A view of the rear of your aircraft's cockpit, from the inside
0 ..... Brings you back to your cockpit from an outside viewpoint.
- ..... Reduce your RPM continuously, in small increments.
+ ..... Increase your RPM continuously, in small increments.
BACKSPACE .. Inside Combat Lock
TAB ..... Acceleration time toggle
W ..... Wheel brake
E ..... External fuel toggle switch (switches the fuel feed to the external tanks)
R ..... When at an external viewpoint and using the F2 and F3 keys to rotate around the aircraft, this key will increase the speed of that rotation
T ..... Autopilot will fire the guns for you. It works only when the autopilot is switched on.

P ..... **Pause**

[..... **Look-up towards the rear-view mirror**

] ..... **Look down to see instrumentation**

ENTER ..... **The Outside Combat Lock looks across your aircraft towards the nearest unfriendly.**

A ..... **Autopilot**

S ..... **Sound toggle (There are three levels: off, no engine sounds & engine sounds)**

F ..... **Flaps**

G ..... **Gear**

J ..... **Increase the rate of fire to guns**

K ..... **Decrease the rate of fire to guns**

; ..... **Previous Waypoint.**

' ..... **Next Waypoint**

Z ..... **Impact Viewpoint. Automicatically switches the views to any target your weapons hit**

X ..... **Missile Viewpoint. Automatically switches the views to any weapons you fire**

V ..... **Video toggle**

B ..... **Air Brake toggle**

M ..... **Map screen**

, ... **Minimum Power setting**

. ..... **Maximum Power setting**

SPACE ..... **Fire**

/ ..... **Boost. Excessive use of the boost causes engine damage**

KEYBOARD REFERENCE

F1 ..... Zoom in

F2 ..... Rotate vertically around your aircraft whilst at an external viewpoint

F3 ..... Rotate horizontally around your aircraft whilst at an external viewpoint

F4 ..... External Chase position

F5 ..... Establishes a view of your aircraft with the camera maintaining absolute heading and pitch

F6 ..... External Track viewpoint in which the camera pitches and turns with the aircraft

F7 ..... External Satellite viewpoint

F8 ..... Gives the view across your aircraft to the selected target

F9 ..... View from your aircraft's cockpit of the selected target

F10 ..... Configuration menus

NUMERIC KEYPAD AND CURSOR CLUSTER

ESCAPE	Return to the piloted aircraft
HOME (7)	Weapon Ripple select
PAGE UP (9)	Weapon select
END (1)	Full rudder deflection, Left
PAGE DOWN (3)	Full rudder deflection, Right
INSERT (0)	Gradual rudder deflection, Left
DELETE (.)	Gradual rudder deflection, Right
↓ (2)	Climb
← (4)	Roll to left
→ (6)	Roll to right
↑ (8)	Dive
-	Decreases your RPM by single, large increments
+	Increases your RPM by single, large increments

'SHIFT &' KEYS

1 ..... A view of Flight 1 while keeping control of your aircraft.
2 ..... As 1 but for Flight 2
3 ..... As 1 but for Flight 3
4 ..... As 1 but for Flight 4
5 ..... As 1 but for Flight 5
6 ..... As 1 but for Flight 6
7 ..... As 1 but for Flight 7
8 ..... As 1 but for Flight 8
9 ..... A view of your wingman
0 ..... View of the lead flight
- ..... Reduce your RPM by double the normal amount
+ ..... Increase your RPM by double the normal amount
TAB ..... Super Acceleration time key [normal acceleration-restricting events such as approaching enemy aircraft will not affect this option]
F ..... Toggle the Fixed viewpoint on current aircraft. In Fixed Mode, if you have switched to the nearest unfriendly view the aircraft shown will always be selected, even if another unfriendly gets closer, until it's destroyed. In Free Mode the nearest or currrent viewed object will be reselected if another comes closer.

'SHIFT &' KEYS cont.

; ..... Position information
F1 ..... Tangmere - View of your home base
F2 ..... Missile - View of the missile you just launched
F3 ..... Nearest friendly - View of the nearest friendly aircraft
F4 ..... Nearest enemy - View of the nearest unfriendly aircraft
F5 ..... Current enemy - View of the object you have been assigned to attack, according to the on-screen messages.
F6 ..... Last message - View of the last friendly aircraft to send you a message
F7 ..... Message about - View of the object that the last message refers to.
F8 ..... Ground target - View of the object that you should attack next
F9 ..... Nearest target - A list of possible ground targets

NUMERIC KEYPAD

ESCAPE ..... Returns to your own aircraft from another viewpoint but retains the viewpoint you had last. For example, if you were looking behind an enemy aircraft this option would return you to behind your own aircraft.
- ..... Decreases your RPM by the normal amount
+ ..... Increases your RPM by the normal amount
8, 4, 6 & 2 ..... Inside View directions. 8 = Front view.

'CTRL &' KEYS

1 ..... Jump into the cockpit of Flight 1 leader and take control as the pilot

2 ..... Jump into the cockpit of Flight 2 leader and take control [some missions will only have one flight]

3 ..... Allows you to jump into the cockpit of Flight 3 leader and take control [many missions only have one or two flights]

4 ..... Jump into the cockpit of Flight 4 leader and take control [most missions have less than four flights]

5 ..... Jump into the cockpit of Flight 5 leader and take control [few missions have more than four flights]

6 ..... Jump into the cockpit of Flight 6 leader and take control [few missions have more than four flights]

7 ..... Jump into the cockpit of Flight 7 leader and take control [few missions have more than four flights]

8 ..... Jump into the cockpit of Flight 8 leader and take control [few missions have more than four flights]

9 ..... Jump into the cockpit of your flight Buddy and take control. If you are in the flight leader's aircraft then you will be taken to the wing-man. If you are in the wing-man's aircraft you will be taken back to the flight leader's aircraft.

0 ..... Jump into the cockpit of the mission lead aircraft and take control [as long as this is not a bomber]

Q ..... Bail Out. You can only bail out of the aircraft if you turn your aircraft upside down. No wing-walking here!

'CTRL &' KEYS cont.

E ..... Dump external fuel. The tanks automatically switch to internal fuel at this point.

R ..... When at an external viewpoint and using the F2 and F3 keys to rotate around the aircraft, this key will decrease the speed of that rotation

D ..... Manually toggle the 3D detail to suit your machine

F ..... Reset the Fixed viewpoint on current aircraft in order that you move to the nearest aircraft [Only works in Fixed mode - in Free mode you are always viewing the nearest]

G ..... If the gear is locked in the up position either repeatedly press G to simulate manual pumping of the gear pumps or try this key combination to simulate the use of Carbonic Acid. This bottle of chemicals created a reaction when used to produce a sharp burst of gas pressure which could lower your gear due to lockage.

V ..... Resets video to start and begins recording

F1 ..... Reset zoom

F2 ..... Reset the upwards rotate rate to initial positions

F3 ..... Reset the sideways rotate rate to initial positions

F8 ..... Locks the view across your aircraft to the selected item

F9 ..... Locks the view from in front of your aircraft to the selected item

F10 ..... Increases the rate of flight acceleration

'ALT &' KEYS

X ..... Exit Flight

R ..... When at an external viewpoint and using the F2 and F3 keys to rotate around the aircraft, this key will increase the speed of that rotation

D ..... Automatically selects the level of detail suitable for your machine

F ..... Moves to the next nearest fixed view object [Only works in Fixed mode]

F1 ..... Zoom out

F2 ..... Rotate down around your aircraft whilst on an external viewpoint

F3 ..... Rotate left around your aircraft whilst on an external viewpoint

F4 ..... External Chase position (this key combination duplicates F4)

F5 ..... View looking away from the outside of your aircraft with absolute heading and pitch

F6 ..... View looking away from the outside of your aircraft which pitches and turns with your aircraft

F7 ..... View looking down from your aircraft

F8 ..... View looking from your aircraft to the selected target

F10 ..... Slows the rate of the flight acceleration

KEYS BY SUBJECT
VIEWPOINTS

5 ..... A view of the rear of your aircraft's cockpit, from the inside.

6 ..... A view of the left of your aircraft's cockpit, from the inside.

7 ..... A view of the front of your aircraft's cockpit, from the inside.

8 ..... A view of the right of your aircraft's cockpit, from the inside

9 ..... A view of the rear of your aircraft's cockpit, from the inside

0 ..... Brings you back to your cockpit from an outside viewpoint.

BACKSPACE .. Inside Combat Lock

R..... When at an external viewpoint and using the F2 and F3 keys to rotate around the aircraft, this key will increase the speed of that rotation

CTRL R..... When at an external viewpoint and using the F2 and F3 keys to rotate around the aircraft, this key will decrease the speed of that rotation

ALT R ..... When at an external viewpoint and using the F2 and F3 keys to rotate around the aircraft, this key will increase the speed of that rotation

[..... Look-up towards the rear-view mirror

] ..... Look down to see instrumentation

ENTER..... The Outside Combat Lock looks across your aircraft towards the nearest unfriendly.

VIEWPOINTS

Z ..... Impact Viewpoint. Automicatically switches the views to any target your weapons hit

X ..... Missile Viewpoint. Automatically switches the views to any weapons you fire

F1 ..... Zoom in

ALT F1 ..... Zoom out

CTRL F1 ..... Reset zoom

F2 ..... Rotate vertically around your aircraft whilst at an external viewpoint

ALT F2 ..... Rotate down around your aircraft whilst on an external viewpoint

CTRL F2 ..... Reset the upwards rotate to initial positions

F3 ..... Rotate horizontally around your aircraft whilst at an external viewpoint

ALT F3 ..... Rotate left around your aircraft whilst on an external viewpoint

CTRL F3 ..... Reset the sideways rotate rate to initial positions

F4 ..... External Chase position

F5 ..... Establishes a view of your aircraft with the camera maintaining absolute heading and pitch

ALT F5 ..... View looking away from the outside of your aircraft with absolute heading and pitch

F6 ..... External Track viewpoint in which the camera pitches and turns with the aircraft

VIEWPOINTS

ALT F6 ..... View looking away from the outside of your aircraft which pitches and turns with your aircraft

F7 ..... External Satellite viewpoint

ALT F7 ..... View looking down from your aircraft

F8 ..... Gives the view across your aircraft to the selected target

ALT F8 ..... View looking from your aircraft to the selected target

F9 ..... View from your aircraft's cockpit of the selected target

ESCAPE ..... Return to the piloted aircraft

SHIFT 1 ..... A view of Flight 1 while keeping control of your aircraft.

SHIFT 2 ..... As 1 but for Flight 2

SHIFT 3 ..... As 1 but for Flight 3

SHIFT 4 ..... As 1 but for Flight 4

SHIFT 5 ..... As 1 but for Flight 5

SHIFT 6 ..... As 1 but for Flight 6

SHIFT 7 ..... As 1 but for Flight 7

SHIFT 8 ..... As 1 but for Flight 8

SHIFT 9 ..... A view of your wingman

SHIFT 0 ..... View of the lead flight

SHIFT F ..... Toggle the Fixed viewpoint on current aircraft. In Fixed Mode, if you have switched to the nearest unfriendly view the aircraft shown will always be selected, even if another unfriendly gets closer, until it's destroyed. In Free Mode the nearest or currrent viewed object will be reselected if another comes closer.

VIEWPOINTS

ALT F ..... Moves to the next nearest fixed view object [Only works in Fixed mode]

CTRL F ..... Reset the Fixed viewpoint on current aircraft in order that you move to the nearest aircraft [Only works in Fixed mode - in Free mode you are always viewing the nearest]

SHIFT F1 ..... Tangmere - View of your home base

SHIFT F2 ..... Missile - View of the missile you just launched

SHIFT F3 ..... Nearest friendly - View of the nearest friendly aircraft

SHIFT F4 ..... Nearest enemy - View of the nearest unfriendly aircraft

SHIFT F5 ..... Current enemy - View of the object you have been assigned to attack, according to the on-screen messages.

SHIFT F6 ..... Last message - View of the last friendly aircraft to send you a message

SHIFT F7 ..... Message about- View of the object that the last message refers to.

SHIFT F8 ..... Ground target - View of the object that you should attack next

SHIFT F9 ..... Nearest target - A list of possible ground targets

SHIFT ESCAPE ..... Returns to your own aircraft from another viewpoint but retains the viewpoint you had last. For example, if you were looking behind an enemy aircraft this option would return you to behind your own aircraft.

VIEWPOINTS

[NUMERIC KEY PAD] SHIFT

8, 4, 6 & 2 ..... Inside View directions. 8 = Front
CTRL F8 ..... Locks the view across your aircraft to the selected item
CTRL F9 ..... Locks the view from in front of your aircraft to the selected item
ALT F4 ..... External Chase position (this key combination duplicates F4)

ACCELERATION CONTROLS

TAB ..... Acceleration time toggle
SHIFTTAB ..... Super Acceleration time key [normal acceleration-restricting events such as approaching enemy aircraft will not affect this option]
CTRL F10 ..... Increases the rate of flight acceleration
ALT F10 ..... Slows the rate of the flight acceleration

GEAR

W ..... Wheel brake

G ..... Gear

CTRL G ..... If the gear is locked in the up position either repeatedley press G to simulate manual pumping of the gear pumps or try this key combination to simulate the use of Carbonic Acid. This bottle of chemicals created a reaction when used to produce a sharp burst of gas pressure which could lower your gear due to lockage.

FLIGHT CONTROLS

↑ (8) ..... Elevator forward (Dive)

↓ (2) ..... Elevator down (Climb)

← (4) ..... Aileron (roll) left

→ (6) ..... Aileron (roll) right

END (1) ..... Full rudder deflection, Left

PAGE DOWN (3) ..... Full rudder deflection, Right

INSERT (0) ..... Gradual rudder deflection, Left

DELETE (.) ..... Gradual rudder deflection, Right

8, 4, 6, & 2 ..... Keyboard flight keys

1 ..... Increases the keyboard flight control sensitivity

2 ..... Decreases the keyboard flight control sensitivity

F ..... Flaps

FLIGHT CONTROLS cont.

B ..... Air Brake toggle

CTRL 1 .... Jump into the cockpit of Flight 1 leader and take control as the pilot

CTRL 2 .... Jump into the cockpit of Flight 2 leader and take control [some missions will only have one flight]

CTRL 3 .... Allows you to jump into the cockpit of Flight 3 leader and take control [many missions only have one or two flights]

CTRL 4 .... Jump into the cockpit of Flight 4 leader and take control [most missions have less than four flights]

CTRL 5 .... Jump into the cockpit of Flight 5 leader and take control [few missions have more than four flights]

CTRL 6 .... Jump into the cockpit of Flight 6 leader and take control [few missions have more than four flights]

CTRL 7 .... Jump into the cockpit of Flight 7 leader and take control [few missions have more than four flights]

CTRL 8 .... Jump into the cockpit of Flight 8 leader and take control [few missions have more than four flights]

CTRL 9 .... Jump into the cockpit of your flight Buddy and take control. If you are in the flight leader's aircraft then you will be taken to the wing-man. If you are in the wing-man's aircraft you will be taken back to the flight leader's aircraft.

CTRL 0 .... Jump into the cockpit of the mission lead aircraft and take control [as long as this is not a bomber]

CTRL Q ... Bail Out. You can only bail out of the aircraft if you turn your aircraft upside down. No wing-walking here!

ENGINE CONTROLS

, ... Minimum Power setting
. ..... Maximum Power setting
/ ..... Boost. Excessive use of the boost causes engine damage
E ..... External fuel toggle switch (switches the fuel feed to the external tanks)
CTRL E ..... Dump external fuel. The tanks automatically switch to internal fuel at this point.
- ..... Reduce your RPM continuously, in small increments.
+ ..... Increase your RPM continuously, in small increments.
SHIFT - ..... Reduce your RPM by double the normal amount
SHIFT + ... Increase your RPM by double the normal amount

[NUMERIC KEY PAD]
- ..... Decreases your RPM by single, large increments
+ ..... Increases your RPM by single, large increments
SHIFT- ..... Decreases your RPM by the normal amount
SHIFT + ... Increases your RPM by the normal amount

GENERAL CONTROLS

A ..... **Autopilot**

T ..... **Autopilot that will fire the guns for you. It works only when the autopilot is switched on.**

P ..... **Pause**

S ..... **Sound toggle (There are three levels: off, no engine sounds & engine sounds)**

V ..... **Video toggle**

CTRL V ..... **Resets video to start and begins recording**

F10 ..... **Configuration menus**

CTRL D ..... **Manually toggle the 3D detail to suit your machine**

ALT D ..... **Automatically selects the level of details suitable for your machine**

ALT X ..... **Exit flight**

WEAPONS CONTROLS

J ..... Increase the rate of fire to guns
K ..... Decrease the rate of fire to guns
SPACE ..... Fire

[NUMERIC KEY PAD]
HOME ..... Weapon Ripple select
PAGE UP ..... Weapon select

WAYPOINTS & MAPS

; ..... Previous Waypoint.
' ..... Next Waypoint
M ..... Map screen
SHIFT ; ..... Position information

CREDITS

Programming Team

Paul Dunscombe
Rod Hyde
Chris Orton
James Taylor
Steve Tickle
Dave Whiteside

Artwork

Mark Shaw
Andy McCann

Others

Music: Martin Walker
Manual Text: Paul Rigby
Pack and Manual Design: Definition
Pack Illustration: Philip Castle
Shape file: Andy McCann
World file: Mary Hyde
Photo Ref: Smithsonian Institution, National Air and Space Museum, Photo Archives
Compression: LZEXE: Bellard, France - PKZIP: Pkware Inc., USA

Testing

Andrew McCann
Mark Shaw
Tony Hinds
Paul Welton
Mike Wenn
Tony Byus
Carl Perrin
Richard Hewison
Paul Coppins
John Martin

VirginTeam

Marketing: Danielle Woodyatt & Doug Johns
Design Co-ordinator: Matthew Walker
Production Co-ordinator: Rosemarie Dalton
Production Assist.ant: Rizwan Khan
Producers: John Roberts(ex), Jon Norledge

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Virgin Interactive Entertainment (Europe) Ltd.,
338a Ladbroke Grove, London W10 5AH, England.